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Parnell, F. R. and MacDonald, D. — *South Africa. Cotton Experiment Station, Barberton. Cotton breeding and field experiments.* (*pp. 20–34*).

Cotton.

Selections from the U.4 strain 5143 significantly outyielded the parent in a variety trial. Crosses between the U.4 strains 5143 and 5149 were investigated with a view to combining the stronger plant of 5143 with the greater lint length and ginning percentage of 5149. The same two U.4 strains have been used in crosses with Cambodia, from which back-crosses with the U.4 parent have also been studied. Excellent material has been obtained from the 5143 material, much of it exceeding Cambodia in hairiness. A very hairy strain of Malwa Upland, M.U. 8A, crossed with U.4, has been back-crossed to U.4.
Crosses have also been made between U.4 and fine-linted types of *hirsutum* and *barbadense*.
Work in 1939–40 on varietal susceptibility to cotton boll diseases is also reported in detail.

Maize.

Streak-resistant strains of Peruvian and Hickory were multiplied.

Lochrie, J. V. — *Swaziland. Cotton Experiment Stations. Bremersdorp and Croydon. Progress report for the season 1940–41.* (*pp. 65–72*).

Cotton.

Trials of strains from Barberton were conducted at both stations.

Maize.

Progeny tests of three promising families were conducted at both stations.

Sorghum.

Selection work on Kaffir corn is now confined to mass selection in bulks of the best strains, progeny tests having shown little variation in growth or yield within families.

Groundnuts.

Selection work has been discontinued.

Cameron, G. S. — *Southern Rhodesia. Cotton Station, Gatooma. Progress report for the season 1940–41.* (*pp. 79–86*).

Cotton.

Over 400 single plant selections were made in the field. Observations on colchicine-treated material were continued and native cotton (*Gossypium herbaceum*) was treated with acenaphthene.

King, H. E., Evelyn, S. H., Knight, R. L. and Anson, R. R. — *Anglo-Egyptian Sudan. Progress report of the plant breeding stations, season 1940–1941.* (*pp. 88–110*).

Cotton.

At the Gezira Research Farm, successful replicated tests were carried out with sub-strains of the Sakel strains X1730 and N.T.2. Modifications in the breeding technique have been introduced. Purification of the standard Sakel type M.S.D.S. (Massey's Selected Domains Sakel) has been started and selections made from it on the basis of apparent leaf curl resistance were subjected to progeny testing, which demonstrated the positive value of the selection. Purification of the collection of Old and New World cottons was started.
At the Shambat Sub-Station the work of transferring the factors B_1 and B_2 for resistance to blackarm (*Bacterium malvacearum*) from Uganda B.31 to Sakel has reached the eighth back-cross. Over a ton of seed of N.T.2 homozygous for B_2 has been produced by multiplication from a fifth back-cross. Other blackarm resistant types being multiplied include N.T.2 homozygous for both B_1 and B_2, X1730 homozygous for B_1 and X1730 homozygous for B_2.
In transferring the linked factors B_2 and B_3 from FS.2 (*G. punctatum*) to Sakel the fifth back-cross has been made. By back-crosses to Sakel Gambia native cotton (*G. punctatum*) has been shown to carry two linked factors for blackarm resistance, phenotypically identical with

those of FS.2. The cotton "Hindi weed" was shown to owe its blackarm resistance to a single factor, B_2. By using Harland's RU.4 the gene *R* (reddish flowers and plant body) derived from *G. arboreum* is being transferred to blackarm-resistant Sakel and eighth and ninth back-cross generations will be sown in 1941–43 as well as bulks from earlier back-crosses, for trial. The gene *H* for intense hairiness is being transferred from Tanguis to leading strains of Sudan Sakel, to confer jassid-resistance on the latter. An attempt has also been started to transfer the complete immunity of *Sanguineum* (*G. arboreum* var. *neglectum* f. *bengalensis* H. and G.) to Sakel. In a strain test of resistance to leaf curl, X1730 strains showed significantly greater susceptibility than N.T. 2/38 but did not differ significantly among themselves or from the susceptible M.S.D.S., though they had shown marked resistance at Medani. Of the American Upland strains suited to the Southern Sudan N.T. 58/39 and 511 D have a fair measure of blackarm resistance due to B_2. Factor B_3 is being transferred from *G. punctatum.*
At the Kadugli Sub-Station the work of breeding and testing strains to replace the existing commercial type (Pump Scheme Strain) was continued on established lines.

Dura (Sorghum spp.).
A collection of 244 strains was grown and studied, a progeny test of 17 selections was grown in tenfold replication and variety trials were performed at different places.

Bamia (Hibiscus esculentus).
The strains known as B.S.12 and B.S.12A have been bulked and distributed under the name Momtaza and are proving popular because of high yield, good flavour and non-spiny pods.

Nye, G. W., Hosking, H. R. and Jameson, J. D. — *Uganda. Cotton Experiment Stations, Kawanda and Serere, progress reports for the season 1940–41.* (*pp. 112–26*).

Cotton.
Breeding work at Kawanda comprised reselections of B.181, selections from B.P.52 and Buganda Local, crosses and back-crosses between B.181 and B.P.52 and crosses of Gambia Native from Shambat with B.P.50, B.P.52 and B.181. Variety trials were performed. Types of seed which occur in Buganda Local cotton and differ in respect of amount and colour of fuzz were found to show some differences in germination, ginning percentage and lint length. The type called "normal white fuzz" appears to be the most desirable and an attempt will be made to select a true breeding strain of this type.
In testing for resistance to *Verticillium* wilt seedlings were dipped in a liquid culture of the organism before they had developed root hairs.
At Serere the main objectives of selection are freedon from *Lygus* damage, reasonable resistance to blackarm, improved staple and ginning percentage and entire white fuzzy seeds. Resistance to *Lygus* appears to be to some extent heritable. Variety trials were conducted.

Peat, J. E., Prentice, A. N. and McKinstry, A. H. — *Tanganyika Territory. Progress reports of cotton work 1940–41.* (*pp. 127–56*).

Rice.
Selections for bolder grain were made in Afaa strains from the coast.

Cotton.
Variety trials were conducted at Ukiriguru and selections were made, the objective being to ally a fair degree of jassid resistance with reasonably fine lint. Selection and testing of jassid resistant cottons were continued at Lubaga. Selections from local cotton were made at Kingolwira.

Ducker, H. C. and Miller, W. L. — *Nyasaland. Cotton Experiment Stations, progress report for the season 1940–41.* (*pp. 158–65*).

Maize.
The high-yielding bulk selection used at the Main Station is to be crossed with yellow grained varieties to improve its carotin content.

Cotton.
Selections have been made from Crown Land bulks, from N.17 (from Uganda) and "561" (from Tanganyika). Work on "920" including the development of high quality selections is well under way.

Nigeria. Progress report on work on cotton in the southern provinces for the season 1940–41. (p. 188).

Cotton.

Single plant selections were made from Ishan A.

Hutchinson, J. B., Silow, R. A. and Stephens, S. G. — *West Indies. Trinidad Cotton Research Station Genetics Department. Progress report for the period October, 1940–September, 1941. (pp. 189–95).*

Cotton.

A Nigerian rogue on selfing gave 1 normal : 2 Nigerian rogues : 1 extreme, sterile, corky. In crosses with Upland 3-factor segregation was observed, with normal dominant, but rogues from Upland F_2s proved to be simple heterozygotes.

In studies on mutants affecting the *L* (leaf shape) locus it has been shown that L^B (broad) has the property of causing in $L^L L^B$ plants mutation of L^L (laciniated) to L^B, so that L^L cannot be recovered. A new mutant, L^* has been discovered with similar properties regarding its effect on L^L but which is itself caused to mutate to L^B under the influence of L^B($L^* L^B \rightarrow L^B L^B$).

Two simple leaf types which appeared in India are controlled by a mutant gene, the same in each case, independent of the *L* locus.

The production of three-lobed leaves in New World cottons can be attributed to differential growth rates along the main veins and the tissues between them. In Sea Island, Okra and Superokra genetic control of this process may be regarded as being initiated at successively earlier stages.

A study of anthocyanin inheritance in Asiatic cottons has been presented for publication.

Two main lint colour factors have been demonstrated in *G. hirsutum*, one for light brown, giving a 1 : 2 : 1 ratio in F_2 and probably identical with the brown lint of wild relatives, the other giving an intense mahogany red, only known in one Upland strain from Colombia and probably derived from *G. barbadense*; it operates with complete dominance and causes a reduction in lint length and maturity. Mahogany behaves similarly in *G. barbadense* but the segregation of light brown is more often obscured by modifying factors.

"Corky" appears to be governed by complementary factors.

The modifier background concerned in the inheritance of fuzz has been shown to differ even within the *hirsutum* species. The naked gene is strongly associated with a reduced lint cover, which in turn is less strongly associated with reduced lint index.

In studying the effect of minor genes on lint density of Asiatic cottons it was found that when the major gene was present in the duplex condition, the minor gene had, as expected, little effect on lint percentage but an unexpected effect on seed size. Two duplicate glabrous lintless factors h_a and h_b do not show the linkage relations with other genes that might be expected if their occurrence had been due to the diploid cottons in which they occur being actually derived polyploids.

A study of the cytology and fertility of the colchicine-produced tetraploid Asiatic cotton has been completed and will be published. A sterile rogue of V.135 has been investigated cytologically. Rings were found at first metaphase.

It has been found that the yield of seed cotton per boll is much less from selfed than from open-pollinated bolls.

Rogues and a mutant from Montserrat with non-expansive lint have been added to the type collection. Very hairy, Philippine Upland types and the intensely tomentose *G. mustelinum* may be valuable in breeding for jassid resistance.

Hutchinson, J. B. and Manning, H. L. — *West Indies. Cotton Experiment Station, St. Vincent. (pp. 200–12).*

Cotton.

Using the replicated progeny test technique selection work on superfine Sea Island cottons was continued, the material being V.135, VH (V.135 x Montserrat hybrids) and Barbados Sea Island. Breeding trials, small bulks trials, variety trials and yield tests have now produced good evidence that the VH material, with over 60 mm. lint length, is higher yielding than V.135. Since moreover V.135 shows much less variability it has been decided to concentrate selection work in future on the VH material, while maintaining sufficient progeny material of V.135 for seed supply purposes.

Donald, D. A. — *Fiji. General Experimental Station, Sigatoka, cotton progress report for the season 1940–41. (pp. 214–16).*

Cotton.
Selection and progeny testing was carried out on different Sea Island and Kidney Sea Island back-cross cottons. Re-selection Backcross 172/23/1 was issued for multiplication. J. L. F.

901. R . . . . ., G. N. 575:633(54)
Plant genetics as applied to the agricultural industry in India.
Sci. and Cult. 1942 : **7** : 373–76.
Examples are given of improvements that have been effected in Indian crop plants by single plant selection. In hybridization work the importance of having a suitable range of parental material is emphasized. Instances of the successful use of wide crosses include the many Coimbatore sugar canes and promising hybrids of rice (*Oryza sativa*) and *O. longistaminata*. Attention is called to the importance of the projected Bureau of Plant Introduction for Indian plant breeding.

GENETICS 575.1

902. GATES, R. R. 575.1:576.12
Some recent aspects of genetics.
Proc. N.S. Inst. Sci. 1940/41 : **20** : 127–40.
An address delivered before the Nova Scotian Institute of Science in September, 1941, and providing a summary of some applications of present genetic theory on chromosomes, mutations and chromosome behaviour in *Drosophila* and in *Oenothera* and other plants to evolution and its expression in man.

903. GORDON, C. and SANG, J. H. 575.42
Polygenic inheritance and the Drosophila culture.
Nature, Lond. 1942 : **149** : 610–11.
It is suggested that Mather's selection results (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 252) may be explained by a selection for fertility of females taking place at the same time as selection for the character studied. H. W. H.

904. MATHER, K. and 'ESPINASSE, P. G. 575.42
The polygene concept.
Nature, Lond. 1942 : **149** : 731–32.
Replying to the criticism of Gordon and Sang (see Abst. 903), Mather states the experimental design of his selection experiments and the statistical analysis of his results were adequate to differentiate between genetical and environmental effects. In his letter 'Espinasse suggests that there is a real methodological difficulty inherent in any work involving the concept of polygenes since there is no independent knowledge of the genes which are assumed to be involved and since the number of genes involved as relevant is increased just until they are sufficient to explain the observations. H. W. H.

905. DARLINGTON, C. D. and FISHER, R. A. 575.42
The polygene concept.
Nature, Lond. 1942 : **150** : p. 154.
In replying to 'Espinasse's criticism (see Abst. 904) of the polygene concept, Darlington points out that the suggested methodological difficulty of polygenes being too small in their individual effects to be separated and counted is analagous to the methodological difficulty which was once held to be in the way of accepting the atomic theory. He also points out that the assumption of polygenes is not even *a priori*. Fisher also replies to 'Espinasse and points out that the number of factors assumed to be involved is one of the least influential features of polygenic systems. H. W. H.

CYTOLOGY 576.3

906. FEINDEL, W. H. 576.312.34:576.35
Somatic chromosomes in *Vicia Faba* L.
Proc. N.S. Inst. Sci. 1940/41 : **20** : p. 155.
A paper read before the Nova Scotian Institute of Science in January, 1941, recording the characteristics of chromosome structure in root tips of *V. Faba* during division. "Chromomeric appearances" reported by earlier workers are interpreted as tightly coiled or crossed chromonemata.

PLANT DISEASES 632

907. TOPLEY, W. W. C. 632-1.521.6
The Croonian Lecture. The biology of epidemics.
Proc. Roy. Soc. 1942 : **130** : Ser. B : 337–59.
The results obtained by plant pathologists and geneticists in regard to the production of resistant strains of plants and the discovery of strain differences in plant parasites are briefly mentioned as bearing on the problem of epidemics.

CEREALS 633.1

908. 633.1.00.14(71.27)
Manitoba field crops : their culture and hazards.
Winnipeg, 1942 : Pp. 47.
Recommendations and descriptions of the best varieties for different zones are given in respect of wheat, oats, barley, flax, maize, sugar beet, millet and soya beans.

WHEAT 633.11

909. 633.11:575(94.2)
Wheat varieties in the Wimmera.
J. Dep. Agric. Vict. 1942 : **40** : 222–24.
Quadrat, a Ghurka hybrid produced by the Department of Agriculture, Victoria, closely resembles the parent variety Ghurka, which it has outyielded however by an average of 3.1 bushels per acre over a 6 year period of testing on black soil. The new cross-bred wheats Wannon x Ghurka and Ghurka x White Fife show signs of being promising; the latter, a high quality strong wheat, has given yields of up to 46 bushels per acre.
On red soil the hybrid Ghurka x C.M.G. 5537, a brown chaffed mid-season wheat similar to Quadrat in type, has proved the best yielder but is closely followed by Quadrat.

910. THOMPSON, W. P. and
HUTCHESON, I. 633.11:576.356:581.162.5:575.114
Chromosome behaviour and fertility in diploid wheat with translocation complexes of four and six chromosomes.
Canad. J. Res. 1942 : **20** : Sect. C : 267–81.
In *Triticum monococcum* seven different translocations involving 6 out of the 7 haploid chromosomes have been produced by radiation treatment. By suitable crosses plants with one association of four, two associations of four, or one association of six chromosomes were produced. Sterility in these different types was found to be 5 to 10% for one association of four, 10–20% for two associations of four and 20 to 30% for one association of six whereas random segregation would be expected to produce 66.6, 88.8 and 90% sterility respectively. Cytological examination showed that the arrangement of the chromosomes at metaphase I of meiosis was not in fact random but was very frequently of the zigzag ring or chain type which leads to disjunctional segregation and hence pollen grains with neither deficiency nor duplication. In general, it may be said that 50% sterility ("semi-sterility") is not characteristic of translocations.
The mechanism of this type of segregation is discussed at some length. J. L. F.

911. PLATT, A. W. and
DARROCH, J. G. 633.11–2.112–1.521.6:631.557
The seedling resistance of wheat varieties to artificial drought in relation to grain yield.
Sci. Agric. 1942 : **22** : 521–27.
Watering was suspended when the seedlings reached the 3-leaf stage. Drought periods of 7 days from the point of permanent wilting caused no killing, 19 days caused severe killing

and the best period for testing is thought to be about 15 days. Significant varietal differences were established, varying from almost complete survival to complete killing. The rate of recovery also varied. Correlations of something over 0·51 were obtained between drought survival and yield, and tests such as these are thought to be a valuable means of eliminating low yielding lines or plants from hybrid populations.

912. PLATT, A. W. 633.11–2.7–1.521.6:581.44
The influence of some environmental factors on the expression of the solid stem character in certain wheat varieties.
Sci. Agric. 1941 : **22** : 139–51.

The degree of solidness of the straw, and with it the resistance to the stem sawfly (*Cephus cinctus* Nort.), varied with environmental conditions in certain varieties of *T. vulgare* such as S–615 and S–633 but not in others such as Golden Ball.

OATS 633.13

913. STEPHENS, S. G. 633.13–1.557:575
Yield characters of selected oat varieties in relation to cereal breeding technique.
J. Agric. Sci. 1942 : **32** : 217–54.

The results of population studies and development studies on selected varieties of oats in 1937 and 1938 are reported. Tillering was found to have very little effect on yield. The yield of individual plants became adjusted to differences in population density primarily by variation in number of grains per panicle. The basal grain in spikelets with more than one grain was heavier than that of one-grained spikelets, the average grain weight per spikelet tending therefore to remain constant.

Of the two varieties studied in 1938, the modern variety, Marvellous, showed strong competition between adjacent foot-lengths; yield per acre would therefore be, within wide limits, independent of plant population. In the old variety, Potato, foot-lengths behaved as independent units.

From the development studies it was concluded that increased panicle development could only be gained at the expense of tiller production. In selecting for high yield, therefore, attention should be paid to economy of grain production rather than to general vigour.

J. L. F.

MAIZE 633.15

914. SHOEMAKER, J. S. and 633.15:576.16
WALKOF, C. 635.67:576.16
Sweet corn in Alberta.
Bull. Univ. Alberta 1941 : No. 38 : Pp. 75.

An account is given of the early cultivation of maize by the Indians and of the varieties they grew. The origin of maize in general and of sweet corn in particular is discussed. An attempt has been made, based on material gathered from a number of sources, to arrange sweet corn varieties in approximate order of age, and to include notes on (*a*) the originator, introducer, or both, or the person who first recorded the name, (*b*) the colour class, and (*c*) the parentage and source of origin. The results are shown in tabular form. A diagnostic key is provided for the early varieties suited for growing in Canada, followed by notes on the varietal trends; descriptions are given of the individual varieties and hybrids and of the botany of the plant. The methods of cultivation and seed production are described.

MILLETS AND SORGHUM 633.17

915. RANGASWAMI AYYANGAR, G. N.,
SANKARA AYYAR, M.A.,
NARAYANAN, T. R. and 633.174:582
KUNHI KORAN NAMBIAR, A. 633.174:581.9(54)
The grain sorghums of the *Durra* group.
Proc. Indian Acad. Sci. 1942 : **15** : Sect. B : 133–47.

Descriptions are given of 3 out of the 4 species of the group, namely, *S. Durra, S. cernuum* and *S. subglabrescens*. Notes are given concerning the distribution of the species and their varieties in India.

916. KUMAR, L. S. S. 633.174–2.5–1.521.6:575(54)
Flowering plants which attack economic crops. 1. *Striga*.
Indian Fmg 1940 : **1** : 593–95.
***Striga* research in Bombay.**
Ibid 1940 : **1** : 609–10.
There are certain varieties of sorghum in the presence of which very few *Striga* seeds develop and some varieties are nearing 100% purity for this resistance. They are now being subjected to rigorous testing. *Striga* from different localities varies in virulence and a larger collection of seed of varied provenance is being used for the tests.

RICE 633.18

917. GRANT, J. W. 633.18:575(59.2)
Rice breeding in Burma.
Indian Fmg 1940 : **1** : 606–08.
The main considerations in rice breeding work in Burma have been yield—largely influenced by time of maturity—and quality, determined by a variety of factors such as translucency, colour, milling out-turn, hardness of endosperm, size and shape of grain. The milling out-turn was determined for all breeding material by means of a Minghetti rice machine that deals with 100 grm. samples.
No imported variety has compared with the local selections in yield and quality. Two hybrid strains yielding 10% more than the local varieties and suited to a wide range of conditions in Lower Burma have been produced. The grain of each approaches that of Blue Rose in size and quality.
In crosses between local varieties and exotic strains partial sterility, controlled by complex factors, could be eliminated in 7 or 8 years by selection. In this way strains locally adapted but equal to the exotics in grain quality have been produced.

918. DIXIT, P. D. 633.18:575.242–181.13
A dwarf mutation in winter paddy.
Proc. 29th Indian Sci. Congr. Baroda 1942 : Part III : Sect. Agric. : Abst. 41 : p. 216.
A dwarf mutation is recorded in a pure strain of paddy. The dwarf form, which is pure-breeding and fertile, is similar in morphological characters to the parental strain except for the diminution in size in all parts of the plant, and an increase in tillering capacity. B. P. P.

ROOTS AND TUBERS 633.4

919. BALD, J. G. and
PUGSLEY, A. T. 633.491–2.8:578.088(94.5)
The main virus diseases of the potato in Victoria.
Pamphl. Coun. Sci. Industr. Res. Aust. 1941 : No. 110 : Pp. 40.
In this pamphlet, intended primarily for the field worker confronted by problems of identification, accounts are given of the virus diseases found on the principal Victorian potato varieties and of the distribution and incidence of virus diseases in Victoria. There is also a detailed section on some properties and reactions of a number of viruses from Victorian potatoes.

FIBRES 633.5

920. AHMAD, N. 633.51:581.6(54)
Technological Reports on trade varieties of Indian cottons, 1941.
Technol. Bull. Indian Cott. Comm. 1941 : Series A, No. 53 : Pp. 103.
AHMAD, N.
Technological Reports on standard Indian cottons, 1941.
Ibid. 1941 : Series A, No. 54 : Pp. 115.
These reports are on the same lines as those for previous years (see "Plant Breeding Abstracts", Vol. XI, Abst. 873).

921. IYENGAR, R. L. N. 633.51:581.6:519.241.1
Variation in the measurable characters of cotton fibres. II. Variation among seeds within a lock.
Indian J. Agric. Sci. 1941 : **11** : 703–35.
An investigation was carried out on the variation among seeds, within a lock, of certain seed

and lint characters, namely—seed weight, lint weight, ginning percentage, embryo weight, seed-coat weight, fibre length, fibre weight, immaturity of fibres, number of fibres per seed and surface area of the seed, and on the inter-relationships between these characters. O.K.

922. IYENGAR, R. L. N. 633.51:581.6:519.241.1
Variation in the measurable characters of cotton fibres. III. Variation of maturity among the different regions of the seed surface.
Indian J. Agric. Sci. 1941 : **11** : 866–75.

The surface of the seed was divided into six portions, micropylar end, portion adjacent to the raphe, right side, left side, back of seed and chalazal end. The micropylar end contained a very high percentage of mature fibre; the maturity at the chalazal end varied considerably, from 90% in some strains to 30% in others. In general, no significant differences existed between the other portions, and the maturity was fairly high for all strains.
Supply of better nutrition improved the maturity on a poor soil, but not on a rich soil. Differences in nutrition had a negligible influence on fibre length, weight per cm., and intrinsic fineness. O. K.

923. GOVANDE, G. K. 633.51–2.485–1.521.6:575(54)
Breeding for resistance to cotton root rot in Gujerat.
Proc. 29th Indian Sci. Congr. Baroda 1942 : Part III : Sect. Agric. : Abst. **43** : p. 217.

Surviving cotton plants from fields infested with cotton root rot [*Macrophomina phaseoli* (Maubl.) Ashby] showed partial resistance and continuous selection on this material has given families which show a mortality of only 20–30% as against 95% shown by the susceptible variety Broach 9. Their spinning value however is very low and it is proposed to effect further improvement by crosses with other types. B. P. P.

924. HUSAIN, M. A. and
LAL, K. B. 633.51–2.7–1.521.6(54.5)
The bionomics of *Empoasca devastans* Distant on some varieties of cotton in the Punjab.
Indian J. Ent. 1940 : **2** : Pt. 2 : 123–36.

The incidence and symptoms of attack by this jassid are described for plants of resistant and susceptible varieties.
Though considerable local variation exists it can be said that in the Punjab native cottons are relatively resistant, and American cottons in general susceptible.
On studying possible factors conferring resistance it was found that nymphs of all instars can feed and develop on both resistant and susceptible, hairy and hon-hairy cotton varieties, that adults from nymphs reared on resistant plants show no reduction in fertility, but that oviposition (or possibly hatching) is markedly reduced on resistant varieties.
Susceptibility to infestation was not correlated with the pH of the leaf sap.
Though nearly all resistant cottons are hairy, not all hairy varieties are resistant.

925. BAYLIS, G. T. S. 633.52–2.483–1.521.6(93.1)
Stem-break and browning (*Polyspora lini*) of flax in New Zealand.
N.Z. J. Sci. Tech. 1941 : **23** : 1A–8A.

A general description of the disease is given. Reaction was tested in 19 varieties; the large seeded variety Rio appeared to be immune, and certain other large seeded varieties showed a certain resistance, whilst all small seeded and fibre varieties were susceptible.

926. MAHABALE, T. S. and
BHATE, P. D. 633.526.2:576.312.35
Cytology of the common Bombay fibre aloe, *Agave vivipara* L.
J. Univ. Bombay 1941 : Sect. B. : **10** : Pt. **3** : 51–55.

The chromosomal complex of *A. vivipara* conforms to the *Yucca* type of Sato ("Plant Breeding Abstracts", Vol. V, Abst. 920) and justifies separation of the genus *Agave*, along with some others, into a separate family Agavaceae, as proposed by Hutchinson.
A study of the chromosome numbers has shown that *A. vivipara* ($n = 30$) and *A. cantala* ($n = 45$) should be considered distinct species.

927. BRANDES, E. W. and COONS, G. H. 633.61:551.56:575 633.63:551.56:575
Climatic relations of sugarcane and sugar beet.
S. Afr. Sug. J. 1942 : **26** : 179–83; 251–55.

The authors comment upon the extreme range of the area of sugar cane cultivation and of the climates where it will grow. The existing information on the origin of sugar cane is reviewed.

The production of sugar canes suited to a given set of climatic conditions is a problem that has been approached only recently and is capable of effecting great improvements in yield in many cane growing belts. Investigations now being carried out by the U.S. Division of Sugar Plant Investigations and its co-operators contemplate observations on a large group of wild and of "original" garden forms of cane at each of a series of 10 stations spaced at intervals between the Equator and 37° N. The same group is also being studied under controlled conditions of temperature and light. The group comprises forms collected where they are indigenous extending from 40° N. in central Asia to the southern islands of Oceania. On the basis of these experiments a more discriminating selection for mobilization of basic types adapted to particular climates is possible.

The climatic requirements of sugar beet are outlined. Freedom from bolting is of special importance when beet is grown in unusual environments, such as the autumn planting system of the Imperial Valley, and reference is made to the steps that have been taken to ensure efficient seed production of non-bolting types. The production of curly-top and leaf-spot resistant forms has restored sugar beet to many areas where its cultivation had been abandoned.

928. 633.61:575(68)
A successful field day. Promising new cane varieties.
S. Afr. Sug. J. 1942 : **26** : p. 259.

Interest was aroused by seedlings of Co.421 x Co.312 and, to a lesser extent, by seedlings of P.O.J.2725 x Co.281 **x** Co.301.

929. 633.61:575(94)
Distribution of Q.28 in the Mackay district.
Aust. Sug. J. 1942 : **34** : p. 47.

The new seedling Q.28, selected from new canes grown at the Mackay Sugar Experiment Station, has shown very good promise on the Mackay district farms. It is expected to provide a good substitute for Co.290.

STIMULANTS 633.7

930. HASLAM, R. J. 633.71:575(71.3)
A burley variety makes its debut.
Lighter, Ottawa 1942 : **12** : No. 2 : p. 9. (Mimeographed).

A new variety of burley to be known as "Haronova" will be under observation on 25 different tobacco farms in 1942. It is a cross between Harrow Velvet and Station Standup and has acquired resistance to black root rot, good colour and texture from the former parent and semi-erect habit from the latter.

931. FORD, J. S., FLETCHER, L. and MANSON, T. 633.79:581.6:575(41)
Contributions to the Institute of Brewing Research Scheme. Brewing trials with new varieties of hops raised by Prof. E. S. Salmon, at Wye College, Kent, and grown at various places; 1941 growths.
J. Inst. Brew. 1942 : **48** : 136–37.

Analysis of several new varieties has shown that lupulin content and quality cannot be reliably estimated by inspection. Certain varieties which themselves had an objectionable aroma produced excellent beers. Many of the new English hop varieties have resin contents and preservative values equal to and often greater than those of any imported hops and present a variety of flavours to choose from.

RUBBER PLANTS 633.91

932. GREENWAY, P. J. 633.913–1.524(67)

Wild rubber in East Africa.

E. Afr. Agric. J. 1942 : **7** : 224–27.

Wild rubber is obtained in East Africa from several members of the *Apocynaceae*, chief among which are *Clitandra orientalis* K. Schum., *Funtumia elastica* (Preuss.) Stapf, *Landolpha* spp. and *Mascarenhasia elastica* K. Schum. Descriptions of these species are given, with data on their rubber yielding abilities and methods of preparing the rubber.

FRUITS 634

933. LEWIS, D. 634.23:581.162.52:577.17

Breakdown of self-incompatibility by α-naphthalene acetamide.

Nature, Lond. 1942 : **149** : p. 610.

It is suggested that the action of α-naphthalene acetamide in making self-incompatible plants (e.g. *Trifolium repens; Brassica oleracea*) self-compatible (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 100) is not to neutralize the effects of an ovarian secretion but to delay the formation of an abscission layer at the base of the style. In *Prunus avium* the author found that this abscission layer formed two days earlier in untreated and unpollinated or incompatibly pollinated flowers than in flowers treated with α-naphthalene acetamide or pollinated with compatible pollen. No fruits, however, were obtained in *P. avium* after α-naphthalene acetamide treatment and self-pollination. H. W. H.

934. KUMAR, L. S. S. and
RANADIVE, K. 634.41:576.312.35

A cytological study of the genus Anona.

J. Univ. Bombay 1941 : Sect. B. : **10** : Pt. 3 : 1–8.

The species studied are *A. squamosa*, *A. reticulata*, *A. muricata* and *A. cherimola*, all of which bear edible fruits. They are morphologically very distinct but have the same haploid chromosome number, namely, 7. The possible phylogenetic affinity between the Magnoliaceae, Annonaceae and Menispermaceae is considered.

NUTS 634.5

935. HUMPHREY, N. 634.58:575(67.62)
634.58:581.142:519.241.1:581.48

A note on groundnut selection work.

E. Afr. Agric. J. 1942 : **7** : 220–21.

In consequence of the breeding work referred to in an earlier report (see "Plant Breeding Abstracts", Vol. X, Abst. 58) groundnut strains with low wilt attack are now being grown and yields of over 1,000 lb. per acre have already been obtained.

A slight negative correlation was observed between nut weight and number of nuts per plant, especially when this exceeds 100. Nut weight was correlated positively with percentage stand after germination and in the following season by selecting for nut weight it has been possible to improve the germination of the strains.

VEGETABLES 635

936. LESLIE, W. R. and 635(71)
GODFREY, W. 635:575

Vegetables for prairie farms.

Fmrs' Bull. Dep. Agric. Ottawa 1940 : Bull. 83 : Pp. 78.

Vegetables are discussed according to their place of origin, date of cultivation, botanical position, uses, vitamin content, etc. Examples of the results of breeding over the space of centuries are early maize which now ripens in 2 months as opposed to the original 9, and the production of broccoli, kale and kohlrabi from the original wild *Brassica oleracea*. Examples of more modern breeding success are rust-resistant asparagus, wilt resistant melons and various other disease resistant garden crops.

After a full account of the procedure used in cultivation, the different vegetables are described, with notes on the existing forms and recommendations of the most suitable varieties.

937. MAHER, F. A. 635.64:575(94.5)

"Tatura Dwarf Globe". A new tomato suitable for market and canning.

J. Dep. Agric. Vict. 1942 : **40** : 241–44

The selection from the South Australian Dwarf tomato, hitherto known as Selection A, has now

been named Tatura Dwarf Globe. It is an all-purpose tomato for home, market garden and canning, moderately resistant to the main tomato diseases, semi-dwarf in habit, second early to late in maturity, with globular fruits, capsicum red in colour and of excellent quality. The variety responds well to intensive manuring. A full description of the variety, with illustrations, is provided.

938. COTTIER, K. 635.652:582(93.1)
Investigations concerning varieties of dwarf beans in New Zealand.
N.Z. J. Sci. Tech. **1942** : **23** : 12A–23A.

Descriptions and illustrations are given of a number of varieties, with indications of synonyms, disease resistance and suitability for canning. Hints are given for identification by seed coat pattern.

939. RANGASWAMI AYYANGAR, G. N. and KUNHI KRISHNAN NAMBIAR, K. 635.654:575.11.061.634
Albinism in lablab.
Curr. Sci. **1941** : **10** : p. 255.

Albina type seedlings were observed in the F_2 generation of a cross in which the parents and F_1 were green; 44 albina plants occurred together with 156 normal in the F_2. Of 20 normal plants tested in F_3 8 bred true for green and 12 segregated 663 normal : 210 albina.

940. RANGASWAMI AYYANGAR, G. N. and KUNHI KRISHNAN NAMBIAR, K. 635.654:581.45:575.11
Tricotyledony in lablab.
Curr. Sci. **1941** : **10** : 255–56.

A tricotyledonous seedling was observed in *Dolichos lablab* L. and gave 10 tricotyledonous plants among 449 of its seedlings.

941. BOYES, J. and BOND, G. 635.655–2.3:576.16
The effectiveness of certain strains of the soya-bean nodule organism when associated with different varieties of the host plant.
Ann. Appl. Biol. **1942** : **29** : 103–08.

Different strains of the nodule organism fixed different amounts of nitrogen according to the variety on which they were inoculated.

942. BATEN, W. D. 519.24

Advantages of singling out degrees of freedom in analyses of variance.

Ann. Math. Statist. 1942 : 13 : p. 113 (Abst.)

This paper pertains to an experiment involving dummy plots for analysing effects of placements and fertilizers for cannery peas. Three fertilizers were used at different distances from the pea seeds at planting, the design being a randomized block layout. Advantages are given for breaking up the sum of squares, due to differences between "treatment" means, into sums of squares, each with one degree of freedom. Methods are given for securing the sum of squares involving dummy plots, and obtaining the variances due to main effects and interaction. Interpretations are given for each phase of the analysis.

943. BATEN, W. D. 519.24

How to determine which of two variables is better for predicting a third variable.

J. Amer. Soc. Agron. 1941 : 33 : 695–99.

Normally we should calculate the two regression equations of the variable to be predicted (y) on each of the other two (x, z) obtaining:—

$$\tilde{y} = \bar{y} + b\,(x - \bar{x}) \quad \text{with } \sigma_e = \sigma_y \sqrt{1 - r^2_{yx}}$$

$$\tilde{y} = \bar{y} + d\,(z - \bar{z}) \quad \text{with } \sigma_e = \sigma_y \sqrt{1 - r^2_{yz}}$$

$\tilde{y}$ being the predicted value of y and σ_e the standard error of the estimate in each case.
Difficulty arises, however, in testing the two standard errors of the estimate as they are correlated in a peculiar manner.
Hotelling has given the correct test (Ann. Math. Stat. XI, 271–283, 1940):

for r_{yx} greater than r_{yz}

$$t = (r_{yx} - r_{yz}) \sqrt{\frac{(n-3)\,(1 + r_{xz})}{D}}, \text{ where } D = \begin{vmatrix} 1 & r_{yz} & r_{yx} \\ r_{yz} & 1 & r_{xy} \\ r_{yx} & r_{xz} & 1 \end{vmatrix}$$

is distributed as Student's "t" for $n - 3$ degrees of freedom.
The test is illustrated on two examples from agriculture. O. K.

944. CAMP, B. H. 519.24

Some recent advances in mathematical statistics, 1.

Ann. Math. Statist. 1942 : 13 : 62–73.

This paper critically summarizes a mass of statistical theory from sources published monthly in the last 5 years on the following subjects:—the theory of tests; estimation; likelihood tests; the method of randomization.
The bibliography of 51 references does not include articles published in Biometrika after 1940.

945. CRAIG, C. C. 519.24

Recent advances in mathematical statistics, II.

Ann. Math. Statist. 1942 : 13 : 74–85.

This paper extends the critical survey of the preceding article (Abst. 944).

946. WALLIS, W. A. 519.24

Compounding probabilities from independent significance tests.

Ann. Math. Statist. 1942 : 13 : 111–12. (Abst.).

For combining the probabilities obtained from N independent tests of significance into a single measure, the product of the N independent probabilities provides a criterion which, though rarely ideal, is usually satisfactory. The probability that such a product will be less than Q always exceeds Q, and is the sum of the first N terms in a Poisson series whose parameter is—$\log_e Q$; since this sum is also the probability that a value of χ^2 based on $2N$ degrees of freedom will exceed—$2 \log_e Q$, existing tables of χ^2 may be used to test the significance of a product of probabilities. If any of the probabilities have been derived from discontinuous distributions, as is likely with small samples of non-metric data, this method of calculating the probability of the product fails; in such instances it invariably overstates the probability of the product. Formulas are given for various special cases arising frequently in practice and also for the general case of $D + C$ tests of which D are based on discontinuous distributions and C on

continuous distributions. In several illustrative examples, the overstatement of the joint probability consequent upon neglect of discontinuities is of the order of 100 to 200 per cent.

947. Bonnier, G. 519.24:575.116.1
The χ^2 linkage test.
Hereditas, Lund 1942 : **28** : 230–32. (Abst.).
It is shown that to ensure that the usually adopted χ^2 linkage value is to equal zero it is not enough that there is a complete absence of linkage, it is also necessary that one or both of the segregations must at the same time follow the 3 : 1 hypothesis. In other words, χ^2 is not a test of the single biological process, absence of linkage, but of at least two different processes, absence of linkage and a 3 : 1 segregation.

948. Hoogland, J. J. and
Bär, A. L. S. 519.24:631.421
Gedetailleerde variatie-analyse van proefveldresultaten. (**Detailed analysis of variance of the results of plot trials).**
Arch. Suikerind. Nederland. Ned.-Ind. 1941 : **2** : 402–07.
For the benefit of planters of the Netherlands East Indies the author demonstrates by a concrete example the value of proceeding to as detailed an analysis as possible in evaluating the data from comparative plot trials of varieties, manures, etc.

949. Wanner, H. 519.24:631.421
Streuungszerlegung, ein Hilfsmittel der modernen Statistik zur Beurteilung von Sortenanbauversuchen. (**Analysis of variance, an aid of modern statistics for judging variety trials).**
Landw. Jb. Schweiz 1941 : **55** : 773–82.
The method of the analysis of variance, so extensively used in England and the United States in agricultural and genetic research, is stated to have been little used in practical circles on the continent.
This paper provides some examples to show that this generally applicable method is particularly suited for the evaluation of variety trials.

950. Zuber, M. S. 519.24:631.421
Relative efficiency of incomplete block designs using corn uniformity trial data.
J. Amer. Soc. Agron. 1942 : **34** : 30–47.
Four incomplete block designs, the lattice square, balanced lattice, the lattice and triple lattice, are applied to corn uniformity trial data, assuming 25, 49, 81 and 121 varieties in plots of sizes 2 x 5, 4 x 5, 2 x 10 hills. The average gain in precision over complete randomized blocks was found to be 25% without, and 31% with the recovery of inter-block information. With recovery of inter-block information the gains were, for the lattice square with $\frac{(k+1)}{2}$ replications, 44%, with $(k+1)$ replications 43%, for the balanced lattice 31%, for the lattice 33% and for the triple lattice, 31%.
Examination of the coefficient of variation and the standard error of the mean indicated that the 2 x 5 hill plot with twice as many replications, but occupying the same area, was more advantageous than 4 x 5 or 2 x 10 hill plots.
The 2 x 10 hill plot was superior to the 4 x 5 hill plot even in the lattice square, probably due to the fact that soil heterogeneity ran mainly in one direction.
The results also indicated that the more compact the blocks could be made, the more efficient the design would be. O. K.

951. Down, E. E. 519.24:631.421:633.1
Plot technic studies with small grains.
J. Amer. Soc. Agron. 1942 : **34** : 472–81.
The studies reported deal with the width of plot necessary to off-set competition effects arising between contiguous plots of winter wheat and between contiguous plots of spring barley. The minimum width of plot to use is a five-row plot for winter wheat and a three-row plot for spring barley. The outside border rows in each case should be discarded. The average minimum number of replications needed to reduce the annual standard error of the mean to 5 per cent. of the mean is three with winter wheat and seven with spring barley.

952. LeClerg, E. L. 519.24:631.421:633.491
Relation of field plot design to seed-source tests of Irish potatoes in the south.
Amer. Potato J. 1942 : **19** : 75–79.
It is suggested that lattice designs are more efficient than randomized block arrangements when tests contain 36 or more varieties. H. W. H

953. Bigot, A. 519.24:631.421:633.61(92.2)
Factorieele vakkenproeven in de Java-suikerindustrie. (**Factorial plot experiments in the Java sugar industry**).
Arch. Suikerind. Nederland. Ned.-Ind. 1941 : **2** : 361–64.
The "factorial design" technique is explained with reference to its applications to the technique of sugar-cane variety and manurial trials in Java.

954. Baten, W. D.,
Northam, J. I. and
Yeager, A. F. 519.24:631.421:635.64
Grouping of strains or varieties by use of a latin square.
J. Amer. Soc. Agron. 1941 : **33** : 616–22.
An example is given of the testing of 64 strains of tomatoes by dividing them into four groups of 16 strains each, and using a Latin square with split plots.
Bartlett's test for the homogeneity of variances was used to decide whether the error variances of the four groups could be pooled to give an estimate of error. The testing of the difference between means of the same group and means of different groups was demonstrated.
Yields of certain plots which appeared to be extraordinary were estimated by the missing plot technique. O. K.

955. Dodd, E. L. 519.271.3
Certain tests for randomness applied to data grouped into small sets.
Ann. Math. Statist. 1942 : **13** : p. 113. (Abst.)
Yule's criticism (1938) of "Tippett's random sampling numbers" as not being satisfactorily random has not been borne out by the tests here described.

956. Mood, A. M. 519.271.3
Stratified sampling.
Ann. Math. Statist. 1942 : **13** : p. 113. (Abst.)
When certain relations between the probabilities $p_1, p_2, \ldots, pk$ of a multinomial population are known in advance, the technique of stratified sampling provides more efficient estimates of the probabilities than does random sampling. Under certain conditions of stratified sampling, however, the maximum likelihood estimates, n_i/n, of p_i are biased but are unbiased in the limit as the sample size increases. The methods and results of the theory of maximum likelihood require no modification to be made applicable to the problem of estimation in stratified sampling; in fact the results of this theory imply the use of stratified sampling when the conditions for its use obtain.

957. Satterthwaite, F. E. 519.271.3
A generalized analysis of variance.
Ann. Math. Statist. 1942 : **13** : 34–41.
With a view to promoting more extended and varied use of the analysis of variance in its practical applications, this paper has been written to examine the basic principles of the method to demonstrate how designs (other than the present well known simple standard types) may be constructed and applied to almost any data which can be assumed to be normally distributed.

BREEDING 575

958. Kreutz, H. 575:007(43)
Ludwig Kiessling.
Züchter 1942 : **14** : 96–98.
A brief outline of the late Prof. Kiessling's work in breeding barley and many other crop plants.

959. MEYER, H. A. 575:633(43)
Die neuen Versuchs- und Forschungsanstalten. **(The new experiment and research institutes).**
Mitt. Landw. 1941 : **56** : 705–06, 725–26, 745–46.

The Versuchs- und Forschungsanstalt für Landwirtschaft (Agricultural Experiment and Research Institute) in Vienna is concerned with producing crops suitable for the hot dry summers of the Pannonian zone; breeding high quality wheats suitable for the area is one of the foremost problems; winter-hardiness and early maturity are essential qualities in any variety produced.
Other plants which are receiving attention are soya beans, *Arundo Donax* and a number of new oil plants including *Cucurbita.*
At the Versuchs- und Forschungsanstalt für Wein- und Obstbau (Experiment and Research Station for Viticulture and Horticulture) at Klosterneuburg, the work of vine breeding is being continued, a vine combining disease resistance, quality and suitability to the Austrian climate being the object. Breeding is also being carried out with other fruits.
The Reichsforschungsanstalt für Landwirtschaft (State Agricultural Research Institute) at Bromberg carried out variety tests with the main field crops.

960. 575:633(47)
("Jarovizacija" post-bag).
Jarovizacija 1941 : No. 3 (36) : 150–56.

Various matters were referred to in the letters to the editor: apricot seedlings produced in the Ukraine survived through the Leningrad winter and their seedlings are to be tried further north still; by watering seedlings of *Helianthus cucumerifolius* with a manurial solution containing lithium carbonate a constant strain was produced in which the plants were twice the normal size and the flowers and seeds much larger too; pollination of the tomato variety Market Wonder with a mixture of pollen from 5–6 flowers from a different lot of seed, grown under different conditions, produced seed with a 1,000 seed weight of 4 grm. as compared with 3 grm. in the control; a method of emasculating pea flowers by holding the flower in the thumb and forefinger of the left hand and removing the floral organs with the same fingers of the right hand is described; yield increases of 5–8 c. per ha. were obtained by artificially cross-pollinating maize, a yield of up to 52 c. being obtained in this way; various unusual grafts were made; information is given regarding vernalization of radishes and buckwheat and on the summer planting of potatoes. The pea varieties Alaska and Karlik (Dwarf) escaped damage by the black aphis probably on account of their early flowering.

961. —HALL. 575:633(48.5)
Utsädesföreningens årsmöte. **(Annual meeting of the Seed Association).**
Lantmannen 1941 : **25** : 614–15.

At this meeting held in July, 1941, at Kristianstad, Å. Åkerman made a report on the improvement of agricultural crops for sandy soil. Petkus rye is regarded by many as particularly suitable for such soil and breeding for this purpose is desirable. Also wheat No. 01312 should be tried under such conditions in view of its drought resistance and winter-hardiness. Some interesting new oats have also been bred from crosses between drought resistant lines from crosses between Swedish land oats and Guldregn II.
Potatoes, various root-crops and legumes are being investigated and a yellow lucerne that is often found growing wild on the poorest soil is being used in breeding for improvement and has proved highly promising.
Though up to 50,000 kg. of green matter per hectare were obtained from maize on sandy soil, certain difficulties were encountered in regard to seed production.
A couple of new strains of soya bean from Svalöf have yielded 50% more than the existing imported varieties.
Early varieties of maize, e.g. Manalta, are recommended for sandy soil on small farms.
O. Tedin reported on aims and methods in potato improvement in Southern Sweden. Breeding for a good and reliable yield and for quality is in progress. Aims differ, however, according to whether the variety is intended for food or for manufacture; but the most suitable fodder type is as a rule identical with the best factory type. Potatoes for food should be free from the defect of discoloration on cooking; but on the other hand many prejudices as regards the

colour of the tubers should be eliminated. In manufacture the most important characteristic is a high starch content. The importance of stimulating a demand for fresh and pure seed by growers was emphasized. At Borrestad experiment centre, which has been taken over as more suitable soil for potato breeding, an account was given of methods of raising new varieties from seed obtained from crosses.
G. Andersson described the work on breeding soya-beans, maize and poppies.
Experiments on tobacco and oil plants are also in progress.

962. KOBLET, R. 575:633(49.4)
Wandlungen und Probleme des Pflanzenbaus seit dem 18. Jahrhundert. (**Changes and problems in agriculture since the 18th century**).
Landw. Jb. Schweiz 1941 : **55** : 614–22.
In a brief survey of the achievements of Swiss plant breeding, the success of the cereal breeding work based on selection from land races is mentioned. Standing capacity and yield have been introduced into the land races by hybridization.

963. 575:633(78.8)
633.174:575(78.8)
To Colorado legislators. A report from the Colorado Experiment Station, Fort Collins.
1940 : Pp. 26.
As a result of the work of the Colorado Experiment Station the field crop varieties grown by the farmers have completely changed in the last 20 years. Among the most outstanding are Colorado 37 oats for irrigated land and Brunker for dry land, Colsess barley, the highest yielding hooded barley in the U.S.A., Lico barbless barley, Coes Sorgo and Highland sorghum, the latter yielding 19 bushels per acre over a 9 year period and capable of growing 200 miles farther north than sorghum used to grow.
New vegetable varieties produced by the station include Katahdin and Dark Red McClure potatoes and a new promising variety resistant to scab.

964. 575:633(82)
La Estación Experimental de Guatraché (La Pampa): breve reseña sobre su orígen y desenvolvimiento. (**The Guatraché Experiment Station: brief outline of its origin and development**).
"Granos" Semilla Selecta, B. Aires 1940 : **4** : Nos. 7–8 : 14–15.
A brief outline is given of the work of the station, which has included breeding work with wheat, maize and other cereals.

965. 575:633(92)
Verslag van de Commissie van Advies inzake de Bevordering van de Cultuur van Handelsgewassen over het jaar 1939. (**Report of the Advisory Committee on the Promotion of the Cultivation of Industrial Plants for the year 1939**).
Secretariaat Bericht No. 83, Departement van Economische Zaken 1939 : Pp. 41.
The main contents of this report have been outlined in the article reviewed in "Plant Breeding Abstracts", Vol. XI, Abst. 613.

966. 575:633(92)
Verslag van de Commissie van Advies inzake de Bevordering van de Cultuur van Handelsgewassen over het jaar 1940. (**Report of the Advisory Committee on the Promotion of the Cultivation of Industrial Plants during the year 1940**).
Secretariaat Bericht No. 90, Departement van Economische Zaken 1940 : Pp. 30; also Bergcultures 1941 : **15** : 1091–104.
The outbreak of war led to the concentration of the work of this Committee (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 613) on crops that may be of value in rendering the Netherlands East Indies self-supporting under existing conditions.
The new experiment ground at Tandjong Morawa was taken over and similar extensions were made elsewhere in Sumatra and in Central Java. Owing to war conditions, plans for a "reconnaissance" tour abroad and the establishment of a bureau for the introduction of plant material had to be abandoned.

As regards scientific and cultural research on medicinal plants it was decided that this work should be passed over to the Ned.-Indische Pharmacotherapeutisch Genootschap [The Pharmacological Therapeutic Society of the Netherlands East Indies] founded in the spring of 1940. Over 40 crops were investigated by the Committee during the year and the following summarizes the results to date:—

In the course of selection of *Derris elliptica* Benth. great variation among the wild forms was recorded and the number of toxic forms was very few, but it is hoped that many desirable features of the wild types may be combined with high rotenone content by hybridization. The work on clonal selection has been extended by the addition of about 26 new clones from Changi, Kotari and Djember, with a rotenone content of from 7–13% and an ether extract percentage of 19–28.

From the original 181 selected clones the 90 best, with a rotenone content of 8–14·5% and an ether extract percentage of 25–32·9, were assembled in the Tjilendek collection and 45 clones were selected for multiplication in Java and other parts of the Netherlands East Indies in view of their high root production and high rotenone and ether extract combined with good leaf formation, rapid growth covering the soil, shallow rooting and resistance to effects of weather, diseases and pests. A complete collection was planted at Tandjong Morawa to provide material for variety tests in 1941. As planned by the General Experiment Station for Agriculture, planting material of these clones was also distributed to interested parties.

Problems relating to cultivation and yield also received attention.

A new consignment of *Pyrethrum* seed from Tanganyika was obtained in 1940. Selection was begun in 1939 at Patakbanteng (Diëng) to obtain high yielding strains for further selection and with the resulting plant material a plantation is to be established above Lembang. The pyrethrin content in general is high, in some plantations over 1·3% There are indications that this is genetically conditioned. Abundant flowering was not recorded below an altitude of 1500 metres. It is also greatly affected by soil conditions. Experimental plantations are being laid out on the Karo plateau in Sumatra and in the dry climatic conditions of one of the Soenda Islands.

Two other insecticides whose value is being investigated are: *Lonchocarpus nicou* Aubl. and *Pachyrrhizus erosus* Urban. The seeds of the latter contain a substance related to rotenone and (according to the Institute for Plant Diseases) with a much more powerful insecticide action than *Derris*. Also the yield in one year equals that obtainable from Derris in 2 years.

In spite of the difficulties of cultivation, *Aleurites* is regarded as a promising crop for the Netherlands East Indies and not only has the biology of flowering been studied but since 1937, the Botanical Institute [Plantkundig Instituut] has been working on selection problems such as the assembling of material from exceptional trees in the country, the importation of new material of superior quality and the crossing of various types. The primary aim is to obtain as soon as possible trees of value to the planter, i.e. that give a good yield of seed with oil of good (or average, if need be) quality. In the middle of 1940 the selection work was transferred entirely to the Cultuur technisch Instituut which has indicated the lines on which the raising of high grade mother trees—both as regards quality and quantity of the oil—would be done. Quantity is determined not only genetically but also to a large extent by soil fertility. Though up to the present no mother tree has been found that meets all the specified requirements, it is hoped that an individual combining all the desirable points may be obtained by systematic crossing. The publication of a summary of all available experimental and other data relating to this crop and collected since 1939 up to the present had to be postponed.

The economic advantages of promoting the cultivation of *Perilla ocymoides* L. (as a semi-annual) in addition to tung are pointed out. Chemical analyses have shown that the oil samples from the various existing experiment plots are better when got from low lying regions than from higher land.

Cultivation and research on selection are now in progress and the great diversity of existing forms in the fields is expected to provide good material in selecting for resistance to diseases, shedding, etc.

The possibilities of extending the cultivation of *Musa textilis* Née in the Netherlands East Indies are considered.

The cultivation of *Boehmeria nivea* Gaud. is being widely encouraged. The Buitenzorg Garden of Economic Plants (Cultuurtuin te Buitenzorg) contains 11 varieties of *B. nivea* Gaud; 1 variety of *B. platyphylla* Don. et Ham. and 1 variety of *B. piiosiuscula* Hassk., while a firm

in Sumatra is working with *B. caudata* S.W. The Eerste Ned.-Indische Rami Industrie [First Netherlands Indies Ramie Industry] at the present time prefers *B. nivea* var. *tenacissima*. The varieties of *B. nivea* in the Garden of Economic Plants have come from Japan, Indo-China and various parts of Java. The existing plantations already exhibit very considerable variability in growth, height, tillering, branching, shape and colour of leaf, stem colour, etc., and selection should therefore be very successful.

As regards other fibre plants, although experiments for 100 years have been made with cotton and the varieties Peradeniya and Cambodia have given some satisfactory results, cotton production is unlikely to be introduced on any considerable scale at present. A fibre research institute would however be of much value in solving initial problems connected with the development of fibre plants. In the meantime, the Committee has organized crop tests of the following which produce a fine, soft fibre: *Sida glutinosa* Cav., *Urena lobata* L. *Triumfetta* spec. The species *Broussonetia papyrifera* Vent. and *Fatsia papyrifera* Hook. are also being tested in experimental plots as they are expected to be of value for the production of paper and cellulose. *Agave amaniensis* T. et N. has been imported and is also undergoing tests as a possible source of fibre of superior quality to the ordinary sisal.

The possibilities of promotion of clove (*Eugenia aromatica* O.K.) cultivation with regard to quality in particular are also being actively investigated, though without any positive results so far. Whether high quality is connected with a particular botanical variety (Zanzibar in this case) possibly in conjunction with a certain type of climate has not yet been decided; but the research is being continued. The economic aspect of the distillation of the oil from the leaves has also been examined.

Iles-iles (*Amorphophallus* sp. div.), for which there are good commercial openings, is undergoing cultivation and selection by the General Experiment Station for Agriculture [Algemeen Proefstation voor den Landbouw].

In the research on medicinal plants results of the pharmacological work which has been continued by P. Sorgdrager have been published elsewhere.

In connexion with the production of chaulmogra oil, tests have been made with oils from *Hydnocarpus anthelmintica* and *Taraktogenos Kurzii* from the government agricultural concerns and both preparations have found approval at the Central Leper Institute.

Cucurbita moschata Duch. has been chemically examined with some interesting results up to the present.

The preliminary chemical study of *Orthosiphon grandiflorus* Bold. could not yet be completed.

Strophanthus gratus Baill. has been included as a medicinal plant in the experiment plots of the Committee. It grows luxuriantly but does not set fruit readily and a study of the biology of flowering is therefore being made by the Botanical Institute.

A sample of seed from a fruit from the Kaliparee experiment plots was found to contain over 7% of crystalline glucoside.

A survey of the plants and crops undergoing investigation at the various experiment plots from January 1938 to the end of 1940 is appended to this report with a list of official and other publications issued during 1940.

A list of the publications of the Committee and of the experimental centres with particulars of soil, climate etc. is included.

967. Coolhaas, C. 575:633(92.2)
Een overzicht van de werkzaamheden van het Proefstation Midden- en Oost-Java in 1940. (**A survey of the activities of the Central and East Java Experimental Station in 1940**).
Bergcultures 1941 : **15** : 676–85.

It is hoped that it will be possible to extend the amount of field experimentation and in Central and East Java additional ground for research work has been acquired, including urgently needed high lying plantations for rubber so that the selection of legitimate Hevea families under local conditions can now be started.

A number of legitimate families obtained from crosses made at the Experiment Station are to be laid out in the new experimental plantation at Soember Djeroe. Hybridization is also to be continued on a small scale.

In addition, selections from these families are to be made to obtain a local type in the high lying rubber country for comparison as regards suitability to the environment, with selections from the selection centre in West Java.

Records of growth differences between various clones have also been collected in a number of districts and a similar study has been made in order to compare the merits of the available seedling material.
In the Robusta and Conuga group of coffees more crosses were made, mainly with clones from the family Con. SA. 36 x BP. 42 and the clone SA. 425.
Some mother trees were chosen, in a few legitimate families, some for large size of bean and suitability as grafts with lateral shoots and others for performance in damp districts.
Drought resistance studies were also carried out.
Mother tree selections of Excelsa were made both in East and Central Java.
Different species crosses have also been made, using the newly imported plants collected in Africa, with the object of transferring characters such as superior flavour (Arabica), bearing on young wood (Eugenioides Kapakata), and less tendency to be affected by unfavourable weather conditions (Congensis), to the Robusta types. The necessary preliminary cytological research for such crosses has also been pursued and also cytological examinations of existing Arabica-Robusta or Arabica-Conuga hybrids from Djember. Some of the latter promise to give a good set.
Selection for eel worm resistance is proceeding in experiments with buddings and cuttings of Conuga (SA. 36) and S.A. 24 and Bgn 300. Conuga has shown considerably more resistance than Robusta and experiments with it are to be continued on a large scale.
The testing of the merits of clonal and legitimate seedlings for use as budding and grafting material was continued and some other hybrid seedlings had just come into bearing. A number of crosses with SA. 34, BP. 42 and SA. 425 as one of the parents seem promising. Among the illegitimate families the B.P. 42 has excelled.
Records of growth differences between various clones have also been collected in a number of districts and a similar study has been made in order to compare the merits of the available seedling material.
The resistance of different seedlings to Fomes infection is being investigated.
Selfing of a large number of cacao clones and mother trees from Djatiroenggo, Getas and Assinan has again been carried out to determine which are self-sterile, and which self-fertile. The results show considerable variation, but the clone Djatiroenggo 1 appears to be self-sterile. The other Djatiroenggo clones are self-fertile, but they differ in the set obtained from selfing. This is also true of the Getas clones of which 2, 7 and 15 are probably self-fertile to a small extent. The Assinan clones gave very poor sets.
Various artificial crosses were made with the Getas clones to study flowering and fruiting and to obtain legitimate families for future selection work. In this investigation artificial pollination showed from 31–77% success, whereas the firm H.G. Th. Crone reported about 1% success in two separate experiments. The reasons for inadequate natural pollination should be investigated as well as flowering and the dropping of the young fruits as a result of physiological causes.
The crosses Dj. 1 x 2 made in the previous year are to be planted out in the new experimental plantation Kedoengpani.
All estates are called upon to assist in the selection of mother trees from which clones can be tested at Kedoengpani. Centralized cacao selection and breeding could thus ultimately be established on a large scale.
Yield records have been obtained from a good test plantation with illegitimate families from Djatiroenggo. The most promising families appear to be Dj. 38, 39 and 37.

968. CÂMARA, A. and LORENA, M. 575:633:581.02
A influência do meio no "ennobrecimento" das variedades culturais. (**Influence of environment on the "nobilization" of crop varieties**).
Rev. Agron., Lisboa **1941** : **29** : 98–99.

The best and most responsive varieties can only be selected when optimum conditions are provided for the experimental material during the breeding process.

969. PIRES, D. R. V. 575:633:581.1
O melhoramento de plantas e a fisiologia. (**Plant breeding and physiology**).
Rev. Agron., Lisboa **1941** : **29** : p. 111.

The time has now come, the author affirms, when plant breeding can no longer be successfully pursued without recourse to plant physiology.

970. Camara, A. 575:633–1.557
A produtividade no quadro da genética actual. **(Yield in the modern genetical picture).**
Rev. Agron., Lisboa 1941 : **29** : 28–55.

To illustrate the complexity of the problem of breeding for yield the author gives some figures showing the number of genotypes it is possible to produce when large numbers of genes are operative. It is also shown how selection, while effecting improvements in certain desired respects, may rob the race of its adaptability; this process is affected however by mutation. The use of inbreeding is supported on the grounds that it reveals the potentialities of the material.

The difficulty and complexity of many practical problems are illustrated by milk yield in cattle, fat content in maize, and egg production in poultry. The author emphasizes the importance of breeding under optimum conditions of development and the necessity for co-operation between competent specialists in all the cognate sciences.

971. Stevens, N. E. 575:633–2.4–1.521.6
How plant breeding programs complicate plant disease problems.
Science **1942** : **95** : 313–16.

It is pointed out that many varieties which have been bred as resistant to a specific disease are often very susceptible to other diseases. These other diseases which previous to the introduction of the new variety were of minor importance become widespread on the new varieties. Secondly, it is suggested that the widespread culture of hybrid corn both gives corn parasites a uniform host range to attack and also deprives the corn crop of its heterozygosity and ability to adjust itself to the attacks of parasites. H. W. H.

GENETICS 575.1

972. Potašnikova, B. G. 575.12
(The effect of free intra- and inter-varietal fertilization, and its causes).
Jarovizacija 1941 : No. 2 (35) : 98–100.

Various experiments are cited which show that it is not a mere difference between the gametes that makes for success in crossing, and that certain degrees and types of difference are more favourable than others. This explains the selective action of gametes on crossing, and explains why open pollination so often gives better results than artificial crossing. Plants of the local wheat Starorusskaja were grown in the midst of 22 other wheat varieties and emasculated. Although all the other varieties were less hardy than Starorusskaja, the plants resulting from the crossed seed were hardier than the pure variety uncrossed. Certain instances where free pollination is not desirable are mentioned, such as in cotton and sugar beet breeding.

973. Belozerova, N. A. and
Khačaturov, S. P. 575.12:581.162.4:633.14
(The influence of cross-pollination on the yield of plants).
Jarovizacija 1941 : No. 3 (36) : 63–66.

Seed from the third generation after out-pollination with other varieties of a number of varieties of rye was sown in 1939 at Pushkin; almost all proved superior to those that had not been subjected to out-pollination, in respect of height of plant, number of stems and ears per plant, number of spikelets and grains per ear and length of ear.

Further experiments are described in which pollination in the vicinity of other varieties led to an improvement in yield and quality without loss of varietal type.

974. Musiiko, A. S. 575.12:581.162.4:633.15
575.12:581.162.4:633.854.78
(Supplementary pollination—a method of increasing the yield of farm crops, and improving their seed types).
Jarovizacija 1941 : No. 3 (36) : 56–62.

Gappiness and an attendant loss of yield are observed in many cross-fertilizing crops as a result of incomplete pollination. By supplying the plant with an excess of pollen from a variety of different sources it is possible not only to ensure the presence of sufficient pollen

but to provide the opportunity for selective fertilization. This method has been applied extensively in the collective farms with sunflower and other crops and figures are presented to illustrate the yield increases that have been obtained. An average increase of 5·21 c. per ha. was obtained in maize, 2·34 in sunflowers, 1·2 in hemp, 0·64 in lucerne, 2·0 in rye, 2·3 in buckwheat and 3·0 in millet. It is calculated that these differences well repay the amount of labour expended on the operation. The quality of the seed obtained was better and maize plants produced by such seed gave better yields than those produced from uncrossed seed and were less attacked by smut.

975. Tzizin, N. V. 575.127:633
633.11:575.127.5:633.289

(Hybridization—a powerful method in Michurin's plant breeding).

Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : 10–19.

The work of many of the early plant hybridizers is described. Michurin is given the credit of having first utilized the possibilities of interspecific crossing and his work is referred to in some detail. Among the work of later Soviet botanists in distant hybridization, reference is made to the hybrids of sugar beet with wild beet which have given such promising results; hybrids of sunflower with Jerusalem artichoke; tobacco hybrids resistant to mosaic, mildew and other diseases produced by crossing with wild species; valuable new interspecific hybrids of poplars and other forest trees; hybrids between sugar cane and the wild canes of Central Asia; Sarrubra wheat; wheat-rye amphidiploids; and *Triticum-Agropyron* hybrids. Ten new varieties of these *Agropyron* hybrids are now under extensive trial; No. 22850 is exceptionally resistant to lodging; the variety named Skorospelka (see "Plant Breeding Abstracts", Vol. XI, Abst. 943) is exceedingly early and drought resistant. Some of the newer selections have proved remarkably hardy and survived the very severe and snowless winter of 1938/39 during which quite half of the plants of the winter-hardy rye Omka were killed.

The problem of selecting perennial wheats from the *Triticum-Agropyron* hybrids is regarded now as almost solved. A promising perennial rye has also been produced by crossing *Agropyron* with rye; it is hoped in this way to produce a rye with higher gluten content.

976. Piza, S. de Toledo (jun.) 575.182:575.17

Cromossômios e citoplasma em hereditariedade. **(Chromosomes and cytoplasm in heredity).**

Rev. Agric. Piraciciba 1942 : **17** : 51–62.

Dr. S. de Toledo Piza junior replies (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 391), citing authorities such as Goldschmidt and Dobzhansky in support of the principle that the chromosome functions as a whole and not as a series of separate particles or genes, a view put forward by Piza as early as 1930. The author reaffirms his view that geneticists underestimate the importance of the cytoplasm.

977. Riehl, N.,
Timoféeff-Ressovsky, N. W. and
Zimmer, K. G. 575.24:537.5

Mechanismus der Wirkung ionisierender Strahlen auf biologische Elementareinheiten. **(Mechanism of the action of ionizing rays on biological elementary units).**

Naturwissenschaften 1941 : **29** : 625–39.

The Treffer (hit) principle is defined, one hit corresponding to one ionization. The production of gene mutations and the inactivation of phages and viruses are analogous in behaviour and are directly dependent on the irradiation dose. This and the size of the radius of action (Treffbereich), which is of molecular dimensions, leads to the conclusion that a gene mutation consists of the alteration of a single molecule or part of a molecular atomic complex.

978. Turbin, N. V. 575.247:635.64

(Mixed inheritance and somatic segregation in hybrid plants).

Jarovizacija 1941 : No. 2 (35) : 85–97.

F_1 hybrids of the tomato Bison, a round fruited variety, with Borghese, a variety with elongated bilocular fruits, bore fruits varying in type between the two parental extremes, the different types being borne in different positions on the plant. The same phenomenon was observed in other tomato crosses. Other instances are a hybrid between a dioecious, trilocular

cucumber and a hermaphrodite five-locular form, which bore flowers of both types on different parts of the plant. Hybrids between the Chinese pear with entire leaves and a Central Asiatic pear with dissected leaves mostly consisted of mosaics of the two parental types. Many similar cases reported in the literature are cited.
It was noted that the hybrids which showed the clearest variation were those in which the parents differed in specific rank and were about equal in "potency"—i.e. which normally gave intermediate inheritance and F_1 plants differing from one another in character. Thus some of the F_1 plants showed a greater resemblance to one parent, others to the other, and some were intermediate. Differences on individual plants may affect large sectors or only individual organs, according to the stage of meristem development at which they appear; differences in the gametes, resulting in the usual phenomena of segregation are regarded as essentially part of the same process. Experiments are in progress to test the influence of various environmental factors, internal and external, on the process.

979. 575.3

("Jarovizacija" postbag).
Jarovizacija 1941 : No. 2 (35) : 151–57.

Extracts from letters to the editor of "Jarovizacija" include references to the conversion of the winter wheat 2470 into a spring form by sowing it for 5 consecutive years in an incompletely vernalized condition; the conversion of a spring variety into a winter form by sowing in autumn; the production of sunflowers with increased resistance to *Orobanche* from seeds of sunflower grafted on to Jerusalem artichoke; heavier and healthier crops of potatoes from planting in summer instead of spring; the discovery of a number of natural hybrids between peach and almond; and a very early grape produced by Michurin which yields well, and gives 17–19% of sugar in the fruit, which is black, medium in size and of the wine type.

980. Sichermann, Kh. Ja. and Samokhina, Z. F. 575.3:633.11:581.46

(Dominant characters and uniformity in the first hybrid generation).
Jarovizacija 1941 : No. 3 (36) : 108–10.

Two crosses were made between a white-eared wheat Milturum 0321 and a red-eared Erythrospermum 0341, firstly between plants growing under optimum conditions and secondly between plants grown with a deficient supply of minerals and water and insufficiently wide spacing. The offspring were all partially awned and in the first cross bore white ears, in the second cross red ears.

981. Udol'skaja, N. L. 575.3:633.11:581.46:575.114

(Conditions of development of seed in the ear, and the process of segregation in spring wheat hybrids).
Jarovizacija 1941 : No. 3 (36) : 101–04.

Grains were taken from the upper, middle and lower portions of ears of various F_1 hybrids. Those taken from the upper portions gave rise to a greater number of awned plants than the others. In the F_1 Marquis x Fetisovi 0333 marked differences were observed in the grain produced by different ears, and the progeny of the different types of grain was also different in ear and grain characteristics.

982. 575.3:633.16:581.46
Mukhin, N. D. 575.3:633.1:581.46

(Variability in the yielding capacity of the seed progeny from different parts of the ear).
Jarovizacija 1941 : No. 3 (36) : 104–06.

Seeds from the upper, middle aud lower portions of the ear of Wiener barley were sown separately; also seed from the 1st, 2nd and 3rd ear of the plant. Differences were observed in the yield of the resulting plants and also in the unselected progeny of these plants. Similar effects were observed in wheat and oats.

CYTOLOGY 576.3

983. Buck, J. B. 576.312.34:578.08

Micromanipulation of salivary gland chromosomes.
J. Hered. 1942 : 33 : 3–10.

This paper (which has a bibliography of 32 references) includes a review of work on micromanipulation of chromosomes.

984. SUGIURA, T. 576.312.35
Studies on the chromosome numbers of higher plants. IV.
Cytologia 1940 : **10** : 324–33.
The author adds to his list of plants of which the chromosome number has been determined, 37 new species from 15 families. R. M. I.

985. SUGIURA, T. 576.312.35
Studies on the chromosome number of higher plants. V.
Cytologia 1940 : **10** : 363–70.
Twenty-seven new plants are included in the list for which chromosome numbers are given. R. M. I.

986. ÅSKELL and
LÖVE, D. 576.312.35:581.9(48)
Notiser—Till nordiska cytologer och botanister. (**Notes—To Scandinavian cytologists and botanists** !)
Svensk Bot. Tidskr. 1941 : **35** : p. 320.
The authors propose to draw up a survey of the chromosome numbers of Scandinavian plants and they request that all workers in the four Scandinavian countries who are carrying out chromosome determinations on indigenous plants should co-operate by communicating their findings to the Genetiska Institutionen [Genetic Institute], Lund, Sweden.

987. FRÖIER, K.
GUSTAFSSON, Å. and
TEDIN, O. 576.356:537.531:576.356.5:519.24
The relation of mitotic disturbances to X-ray dosage and polyploidy.
Hereditas, Lund 1942 : **28** : 165–70.
Data obtained from X-ray irradiation of *Triticum monococcum*, *T. dicoccum*, *T. durum*, *T. vulgare* and *Avena sativa* were subjected to statistical analysis, on the basis that "if exactly the same number of cells is studied in each species-dosage combination, the relative rates of disturbances may be correctly expressed simply by the number of disturbed cells observed." The number of disturbed divisions in the 1,200 cells first observed was noted and subjected to a χ^2 analysis. The results showed clearly that the percentage of disturbed cells does not increase in direct proportion to the X-ray dosage in the diploid and tetraploid species; a fairly close proportionality was observed in the hexaploid species. The relation of dosage to disturbances was different in the different groups, the tetraploids occupying a position more or less intermediate between the diploids and hexaploids. The apparently straight-line proportionality in the hexaploids may probably be merely a flattened form of the sigmoid curve observed in the other two groups.

988. VILLARS, R. 576.356:581.04
Étude cytologique de l'action du thymol sur les cellules végétales. (**Cytological study of the action of thymol on plant cells**).
C.R. Soc. Biol., Paris 1940 : **133** : 206–08.
Observations on nuclei of *Vicia Faba*, *Hyacinthus orientalis* and *Allium Cepa* under the action of thymol led to the conclusion that, though thymol and colchicine have a similar action on chromosome division, on the cell as a whole their action differs profoundly. Thymol is highly toxic and entirely destroys the chondrioma and causes diffusion and ultimate destruction of the chromatin.

989. 576.356:635.64
SIPKOV, T. P. 576.312.35:635.64
(Changes in the number of chromosomes of plant organisms).
Jarovizacija 1941 : No. 3 (36) : 93–98.
A number of cases are cited from the literature where plants belonging to the same family have different chromosome numbers. Acetocarmine preparations were made of the reduction division in a number of tomato varieties. In the variety Earliana cells with 14, 18, 19 and 20 chromosomes were observed, in Ficarazzia 15 and 19, in Break o' Day 18 and 20, and Market Wonder 14, 16 and 19. Still greater and more frequent deviations were observed in plants sown later in the season. Chromosome number is regarded not as a fixed property but as a variable, determined by the action of the environment on the nuclear material.

990. Satô, D. 576.356.5:575.255
(**Experimental production of haploids and polyploids. I.**).
Bot. and Zool. 1938 : **6** : 69–74.

This survey deals with the contributions of Japanese, Russian and other investigators to the problem of polyploidy in somatic plant cells.
The results are marshalled under the following heads: genes conditioning the formation of multi-nucleate cells (e.g. in beets); chimaeras; the induction of polyploidy by chemical and temperature treatments (including desiccation), by irradiation, centrifuging, bacterial action, climatic effects and finally as a result of "protoplasmic disjunction" (e.g. in Tradescantia).

991. Lettré, H. and
Albrecht, M. 576.356.5:581.04
Narcotin, ein Mitosegift. (**Narcotine, a mitotic poison**).
Naturwissenschaften 1942 : **30** : 184–85.

Apart from colchicine, narcotine was the only one of many alkaloids tested which proved to have an inhibiting action on cell division. Its action was much less pronounced than colchicine.

992. Levan, A. 576.356.5:581.04:577.17
The macroscopic colchicine effect—a hormonic action?
Hereditas, Lund 1942 : **28** : p. 244. (Abst.).

Experiments with X-rayed roots of *Allium fistulosum* treated with colchicine solution have led to the conclusion that the enlargement of the cells resulting from colchicine is analogous to that produced by hormones and is parallel, not secondary, to the mitotic effects, which are not evident in X-rayed roots.

993. Bauch, R. 576.356.5:581.04:632.422.3
Experimentell erzeugte Polyploidreihen bei der Hefe. (**Experimentally produced polyploid series in yeast**).
Naturwissenschaften 1941 : **29** : 687–88.
Bauch, R.
Experimentelle Auslösung von Gigas-Mutationen bei der Hefe durch carcinogene Kohlenwasserstoffe. (**Experimental production of gigas mutations in yeast by means of carcinogenic hydrocarbons**).
Ibid 1942 : **30** : 263–64.

Cell division in yeasts is affected by camphor in a way resembling the effect of colchicine on the higher plants; and the same effect has been produced by a number of other substances, among which α-naphthylamin is the most active. A number of polyploid lines have been produced and are distinguished by greater cell size. By further treatment of the polyploids, lines with still greater cell size were obtained and are presumed to be higher polyploids.
Preliminary experiments have shown that the new lines differ in their fermenting properties, one presumed tetraploid, line M120, producing beer with a very fine flavour of the Pilsen type. Cells of double size were also produced by carcinogenic substances such as benzpyrene.

994. Jaretzky, R. and 576.356.5:581.04:633.11
Schenk, G. 576.356.5:581.04:635.65
Versuche mit Acenaphten und Colchicin an Gramineen- und Leguminosenkeimlingen. (**Experiments with acenaphthene and colchicine on graminaceous and leguminous seedlings**).
J. f. Bot. 1940 : **89** : 13–19.

Comparative experiments on the effect of acenaphthene and colchicine on germinating seeds of wheat (*Triticum vulgare*) and of peas, beans and lentils, showed that while colchicine has an inhibiting effect on the growth of all the seeds, acenaphthene, though it inhibits the growth of wheat seedlings, has no such effect on the leguminous seedlings.
A study of the cytological condition showed that after 2–3 days treatment no disturbance in mitosis could be detected in the root-tips of peas, beans and lentils. R. M. I.

995. Kihara, H. 576.356.5:581.5
(**Ecological significance of polyploids**).
Study of Ecology 1939 : **5** : No. 2 : 147–51.

Reference is made to the findings of various investigators of the geographical distribution of polyploid plant forms and their relation to environment.

Polyploidy makes for variation and sometimes results in varieties that can withstand unfavourable environments. Auto- and allo-polyploids, which can be produced artificially, should be thoroughly studied.
The fertility of $4x$ plants may be attributed to "selective conjugation" among the chromosomes operating for many years and resulting in the ultimate arrangement of the four homologous chromosomes into two pairs.

HORMONES 577.17

996. 577.17
Hormona vegetal de efectos sorprendentes. (**Plant hormone with surprising effects**).
Ciencia, Mexico, D.F. 1941 : **2** : p. 363.
An extremely potent growth substance is extracted from maize pollen. One of its many effects is the stimulation of fruit production without fertilization, with the consequent production of seedless fruits of tomato; another is to delay the opening of the flower buds.

997. COUTINHO, L. A. 577.17:635.651:576.356
Formação de células polinucleadas pela acção da traumatina. (**Formation of polynucleate cells by the action of traumatin**).
Rev. Agron., Lisboa 1941 : **29** : p. 102.
Roots of *Vicia Faba* L. punctured with a needle formed a certain number of cells with 2, 3 and 4 nuclei. Different nuclei in the same cell might be at different stages of mitotic activity, and the phenomenon is thought to be due to a failure of cell wall formation under the influence of the hormone traumatin and to have little or no genetical significance.

998. ÖSTERGREN, G. 578.65
Note on the acetocarmine method.
Hereditas, Lund 1942 : **28** : 239–40. (Abst.).
The author recommends staining the anthers overnight or for a few days in iron acetocarmine at room temperature and then smearing. The method has been used with success with *Anthoxanthum*.

FIELD TESTS 631.421

999. BIGOT, A. 631.421:003.63
Grafische voorstelling van proefveldresultaten. (**Graphic representation of experiment plot results**).
Arch. Suikerind. Nederland Ned. Ind. 1941 : **2** : 44–48.
The value of the graphic method of showing experimental results is explained for workers in the Netherlands East Indies with reference to comparative variety and other trials. Illustrations of the various types of curves that may be obtained and their interpretation are given.

1000. LÖFVENMARK, H. 631.421:578.08
Ritning av försöksplaner med skrivmaskin. (**Delineation of plans of experiments with the typewriter**).
Lantmannen 1941 : **25** : 796–98.
A series of examples are described and illustrated, showing a method devised for delineating and tabulating the arrangement of experiment plots for publication, especially in stencilled form.

INTRODUCTION OF NEW SPECIES 631.524

1001. 631.524(81)
BONDAR, G. 633.79(81)
Rumos de lavoura no estado do Espirito Santo e culturas tropicais na Bahia. (**Directions of work in the state of Espirito Santo and tropical crops in Bahia**).
Bol. Inst. Cent. Fom. Econ. Bahia 1942 : No. 10 : Pp. 41.
An account is given of the oil plants, palms, stimulants and other plants. The stimulants include cola and guaraná, whose cultivation could profitably be extended.

1002. Câmara, A. and
Castro, R. 631.524:576.12
Protecção das regiões de interêsse genético. (**Protection of regions of genetic interest**).
Rev. Agron., Lisboa 1941 : **29** : p. 97.
A plea is made for the state protection of areas showing great wealth of genetic variation which may serve as an invaluable source of material for breeding and for the study of micro-evolution.

PLANT DISEASES AND PESTS 632

1003. Schmidt, H.,
Diwald, K. and 632.112–1.521.6:633.1
Stocker, O. 632.112–1.521.6:633.63
Plasmatische Untersuchungen an dürreempfindlichen und dürreresistenten Sorten landwirtschaftlicher Kulturpflanzen. (**Plasmatic investigations on drought susceptible and drought resistant varieties of agricultural plants**).
Planta 1940 : **31** : 559–96.
The experiments were made on pure varieties of drought resistant and drought susceptible oats, barley, wheat and sugar beet. Their osmosis, their viscosity and permeability were studied. Although the varieties showed certain specific differences with regard to osmosis, the osmotic value was not a characteristic of drought resistance.
Within a species, the drought resistant varieties had a higher viscosity than the drought susceptible varieties. The change from moist to dry conditions of cultivation increased the viscosity in each case. The specific viscosity of a variety could be determined in the coleoptile and it is possible that a measurement of the viscosity might be a practical guide to drought resistance in plant breeding.
The experiments on permeability were limited to oats. The change from moist to dry conditions of cultivation decreased the permeability to water and urea but increased the permeability to glycerine. A comparison of resistant and susceptible varieties showed that the permeability of resistant varieties to water, urea and glycerine is greater than that of the susceptible varieties. Lack of potash increases the permeability to water.
Details are given of the phenotypical and genotypical differences in the plasma under moist and dry conditions. The genotypical plasmatic characters shown in resistant varieties depend probably on an increased charge and hydration of the plasma which gives a greater resistance to external influences causing coagulation. R. M. I.

1004. Lindegren, C. C. 632.3:576.312
Nuclear apparatus and sexual mechanism in a micrococcus.
Iowa St. Coll. J. Sci. 1942 : **16** : 307–18.
Various considerations which serve as indirect evidence of the existence of a gene string in bacteria are analysed. By means of an acetocarmine staining technique, which is briefly described, the occurrence of a small deeply staining body in the dividing cell, closely resembling the fungal nucleus, has been demonstrated. Actual chromosomes have been detected and are shown in photomicrographs. The formation of a zygote was observed by the fusion of two genetically identical gametes, each of which originated by the vegetative division of a single haploid nucleus. Since the fusion occurs within a single cell, and since no mechanism was observed capable of permitting the sexual combination of free cells, it is impossible to obtain hybrids in the species studied.

1005. Lindegren, C. C. 632.4:575.1
The use of the fungi in modern genetical analysis.
Iowa St. Coll. J. Sci. 1942 : **16** : 271–90.
In this article the author gives a masterly review of his work on the genetics of *Neurospora*, and concludes that the genes concerned are just as stable as those of the higher plants and animals. Many aberrant results with this and other fungi are shown to be the consequence of faulty technique or false deductions. The many advantages of the fungi for genetical research are mentioned and the article ends with a bibliography of 46 references.

1006. DODGE, B. O. 632.4:576.35:575.36:575.12
Conjugate nuclear division in the fungi.
Mycologia 1942 : **34** : 302–07.

A detailed discussion of the prevailing use and the proper connotation of the term "conjugate division" with illustrations of the anomalies and chaotic contradictions to which lack of precision in its application gives rise. The author urges the use of the old well-tried terminology, e.g. uni-nucleate, binucleate or dicaryotic, multi-nucleate haploid, diploid and polyploid in the usual way.

The terms heterocaryotic vigour, true hybrid vigour, individual vigour and dicaryotic vigour also need clarification in present day usage, if their important implications are to be clearly understood.

1007. BERGMAN, B. 632.421.1:576.37
Zytologische Studien über die Befruchtung und Askokarpbildung bei *Sphaerotheca Castagnei* Lev. (**Cytological studies on fertilization and ascocarp formation in *S. Castagnei* Lev.**).
Svensk Bot. Tidskr. 1941 : **35** : 194–210.

A critical study is made of the subject in recording the author's own experiments. From these he feels entitled to conclude that a single fusion of the male and female nuclei occurs in the bi-nucleate cell which gives rise to the ascus which is formed some time after the initial transference of the nucleus from the antheridium to the oogonium. Special attention is drawn to the considerable difference in the size of the male and female nuclei, which made it possible to trace the behaviour in the various stages up to the time of fusion.

The prophase of the first division of the ascospore mother-nucleus is meiotic.

1008. LANGFORD, M. H. and
KEITT, G. W. 632.421.9:575.12:634.13
Heterothallism and variability in *Venturia pirina*.
Phytopathology 1942 : **32** : 357–69.

Each set of 8 isolates from a single ascus of *Venturia pirina* was found to comprise 4 distinct groups of 2 isolates each. The colony characters remained constant over 8 successive monoconidial transfers. The experiments show that *V. pirina* is heterothallic; the 8 monosporic isolates from each ascus studied comprise 2 groups of 4 isolates each with reference to sexual compatibility, the isolates being hermaphroditic, self-incompatible, intra-group incompatible and inter-group compatible. Fertile pairings differed in the number of ascospores borne and in the time required to produce them. The isolates used in this investigation almost failed to infect Seckel, a pear which is usually found to be susceptible, and Bartlett, reported susceptible in Australia. On Duchess different isolates gave different results, segregation for pathogenicity having occurred in the second nuclear division.

1009. MALLOCH, W. S. 632.421.9:575.243:575.17
The inheritance of induced mutations in *Neurospora tetrasperma*.
Mycologia 1942 : **34** : 325–47.

In this detailed study the value of *N. tetrasperma* as an organism for use in investigating the nature of chemical substances produced by different genes is incidentally pointed out as well as the fact that new strains of fungi can be obtained by X-ray irradiation.

1010. OLIVEIRA, B. D' 632.452:575.12:576.16
Aspectos do problema da sexualidade nas uredíneas. (**Aspects of the problem of sexuality in the Uredineae**).
Rev. Agron., Lisboa 1941 : **29** : 107–08.

Examples are given of how new physiological forms or even varieties of the rust fungi can arise by hybridization and by mutation.

1011. 632.452:576.16:633.1(43)
STRAIB, W. 632.452:576.16:633.52(43)
Weitere Beiträge zur Kenntnis der Spezialisierung der Getreideroste und des Leinrostes. (**Further contributions to the study of the specialization of cereal and flax rusts**).
Arb. biol. Reichsanst. Land.-u. Forstw., Berl. 1941 : **23** : 233–63.

A new race of *Puccinia glumarum* (No. 48) which attacks barley varieties hitherto classed as resistant, has been found in Germany. New races of *P. glumarum* on wheat have also been found. A high degree of specialization was found in *P. graminis*, *P. coronata* and *Melampsora lini*.

1012. FRIES, N. and JONASSON, L. 632.472.3:577.8:581.162.5:575.11
Über die Interfertilität verschiedener Stämme von *Polyporus abietinus* (Dicks.) Fr. [**On the interfertility of different strains of *P. abietinus* (Dicks.) Fr.**].
Svensk. Bot. Tidskr. 1941 : **35** : 177–93.

This study, in which previous findings regarding multipolar sexuality are considered and the experimental material and technique are described in detail, led to the conclusion *inter alia* that the fruit bodies of *P. abietinus* examined were not genotypically completely different in the genes conditioning tetrapolarity and that in certain fruit bodies identical allelomorphs of these genes occurred. Incidentally, diploid hyphae were found to differ from haploids in having a diameter about 35% greater and also a much greater growth rate.
A convenient method of staining with orseillin is described.

1013. MELCHERS, G. 632.8:575.242
Über einige Mutationen des Tabakmosaikvirus und eine "Parallelmutation" des Tomatenmosaikvirus. (**Some mutants of the tobacco mosaic virus and a parallel mutation of the tomato mosaic virus**).
Naturwissenschaften 1942 : **30** : p. 48.
SCHRAMM, G. and REBENSBURG, L.
Zur vergleichenden Charakterisierung einiger Mutanten des Tabakmosaikvirus. (**Comparative description of certain tobacco mosaic virus mutations**).
Ibid 1942 : **30** : 48–50.

Further strains of the tobacco mosaic virus that have originated spontaneously are reported and described. Yellow mutants have been produced both by the common tobacco mosaic and the tomato mosaic virus.
In the second article a brief account is given of the behaviour of the new strains, which differ in their behaviour under electrophoresis. The differences appear to be due to the alteration of the proteins rather than in the nucleic acid content.

1014. MARDJANIAN, G. M. 632.951.1–1.524:581.6
(**To the question of toxic characters of different *Pyrethrum* species**).
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1941 : No. 10 : 26–29.

Chemical analysis has shown the presence of a certain amount of pyrethrin in all species, but the amounts differed according to the method of analysis. The toxicity was tested by the action on *Pieris brassicae* of dust prepared from the different species. The highest insecticidal properties were observed in *P. cinerariaefolium*, *P. roseum*. *P. carneum* and *P. tamrutense*. Contrary to popular opinion, *P. macrophyllum* proved quite inert, while certain forms of *P. roseum* were more toxic than *P. cinerariaefolium*. These results show that chemical analysis alone is not sufficient as a criterion of toxicity.

ECONOMIC PLANTS 633.

1015. KIHARA, H. 633:576.356.5:575.125
(**Development of industry and genetics**). A lecture delivered before the second general meeting of the Society.
Report of General Meeting on Population Problems, published by the Society for the Study of Population Problems 1939 : 991–97.

The economic value of the application of genetics to the development of plants and animals is discussed with special reference to heterosis and polyploidy. Among the illustrations of economically valuable polyploid forms are tetraploid tomatoes with their high vitamin C content; triploid mulberry trees which have long been valued in Japan for their use in sericulture; and triploid tea plants which yield more leaf than other varieties and might therefore be worth exploiting commercially.

1016. VASCONCELLOS, J. DE CARVALHO E 633–1.524(46.9)
Estudo das formas cultivadas. (**Study of cultivated forms**).
Rev. Agron., Lisboa 1941 : **29** : p. 116.

A plea is made for the most intensive study of the local cultivated plants and of the varieties,

races and lines of which they are composed. A statistical study of the variation of the individual characters should accompany the investigation.

1017. Coolhaas, C. 633–1.524(92)
Zijn er mogelijkheden voor het planten van andere gewassen dan de thans in Oost-Java gecultiveerde? (**Are there possibilities of planting other crops than those now cultivated in East Java**?)
Bergcultures 1941 : **15** : 1252–59.
The various crops (cf. Abst. 966) are discussed that could be developed in the Netherlands East Indies to counterbalance the reduction in the area under coffee and rubber due to government restrictions on output.
The possibilities of promoting the more extensive growing of coca, kapok and specially cacao are also considered.
The success that has been achieved in selection work with kapok in the Netherlands East Indies should make this crop well worth developing as a mixed crop to reduce the risk of economic loss.
Cacao selection, though so far conducted on a relatively small scale, has yielded results that could now be widely applied and this crop and/or derris are recommended as valuable substitutes on coffee plantations that after eelworm infection are being used for a new crop.

1018. 633.0015(92)
De opening van de nieuwe laboratoria van het Proefstation West-Java. (**The opening of the new laboratories of the West Java Experiment Station**).
Bergcultures 1941 : **15** : 1342–52.
The origins, history, functions and equipment of the new laboratories for research in plant physiology in relation to tea and cinchona were fully described in the speeches made by the Director and other research workers at the opening ceremony.

CEREALS 633.1

1019. 633.1:582(83)
Pizarro, C. M. 633.2:582(83)
Indice bibliográfico de las Gramineas Chilenas. (**Bibliographical index to the Chilean Gramineae**).
Bol. Téc. Minist. Agric. Dep. Genet. Fitotec., Santiago 1941 : No. 2 : Pp. 88.
The index includes a number of cereals and allied species.

WHEAT 633.11

1020. 633.11(83)
Variedades de trigos genéticos del Ministerio de Agricultura. (**Genetical wheat varieties of the Ministry of Agriculture**).
Minist. Agric. Dep. Genet. Fitotec., Santiago 1940–1941 : Pp. 16.
The territory of Chile is divided into 7 ecological zones and the wheat varieties suitable for cultivation in each zone are indicated. Descriptions are given of the individual varieties and of their agricultural qualities.

1021. Kuperman, F. M. 633.11:551.563:575(47)
(**Variability and structure of winter wheat yield at high altitude zones of Kabarda-Balkarian Autonomous Republic**).
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1941 : No. 10 : 3–7.
A collection of 58 wheat varieties was grown at three points varying in altitude. Differences were noted in regard to tillering, set of grain and grain weight. Some lines of both *T. durum* and *T. vulgare* gave particularly high sets and heavy grains at high altitudes, which shows that great possibilities exist in breeding wheats suitable for mountain zones.

1022. 633.11:575(51)
China: National Agricultural Research Bureau.
Chronica Botanica 1942 : **7** : 83–84.
The successful work of the late Mrs. T. H. Shen, a former member of the National Agricultural Research Bureau, who had been in charge of wheat breeding and improvement, had already resulted in the introduction of valuable Chinese and foreign varieties as well as hybrid varieties

into Chinese agriculture. One particularly successful introduction was "National Research 28" which is now being widely grown in Szechwan. It was derived from an Italian wheat, Milturum villa glori, obtained from Percival's collection. It is resistant to lodging and disease, shows good tillering and gives a particularly heavy yield.

1023. Chorny, E. 633.11:575(82)
Orígen e historia del trigo Guatraché M.A. (**Origin and history of the wheat Guatraché M.A.**)
"Granos" Semilla Selecta, B. Aires 1940 : **4** : Nos. 7–8 : 21–30.

An examination of the archives has shown the wheat in question to have originated from a selection from the variety Kansas made in 1925 by R. Nieves. Extracts are made from his reports, showing the progress of the selection work. A full description of the variety, botanical and agricultural, is given. It has proved one of the best winter wheats for the zones served by the Guatraché station, is resistant to *Ustilago Tritici* and fairly resistant to rust; in quality it is comparable with Lin Calel.

1024. Weibull, W. 633.11:575"793"(48.5)
Vad säga de officiella försöksresultaten om Weibulls höstvetesorter och deras odlingssäkerhet under ogynnsamma betingelser? (**What do the official experimental results say about Weibull's winter wheat varieties and their reliability under unfavourable conditions**?)
Lantmannen 1941 : **25** : p. 668.

A comparative table for 1940 and previous series of years giving the yield of grain from numerous varieties produced at Svalöf and others bred at Landskrona shows in the majority of the trials the superior over-wintering ability of Weibull's Ergo, Ankar II, Äring II, Äring III and Standard II as compared with the Svalöf varieties.

1025. 633.11:575.114:581.02
Šulyndin, A. F. 633.11:575.127.2
(**"Secondary segregation" in hybrids of hard wheats**).
Jarovizacija 1941 : No. 3 (36) : 118–19.

Many of the wheat varieties produced by the Saratov station from crosses between *T. durum* and *T. vulgare* when grown at Smolensk segregated in regard to type of ear and grain.

1026. Šulyndin, A. F./ 633.11:575.115
(**Some examples of dominance and absorption in wheat hybrids**).
Jarovizacija 1941 : No. 3 (36) : 119–20.

Hybrids of African forms of *T. durum* of the type *horanicum* when crossed with Russian or Mediterranean forms showed almost complete dominance of the *horanicum* type even in F_6 and later generations and in spite of repeated selections it was not possible to recover the other type. The same phenomenon was observed in crosses of *T. durum* x *T. dicoccum*, where the latter species was almost completely dominant. In each case the dominant type is regarded as phylogenetically the older.
The recessive characteristics were sometimes manifested in the early growth phases of the hybrids but quite disappeared when the plant approached maturity.

1027. Jakovlev, M. S. and
Ergesjan, R. A. 633.11:575.12:575.148
(**Structural peculiarities of the wheat grain as a result of intravarietal crossing**).
Jarovizacija 1941 : No. 2 (35) : 56–61.

A number of ears of several wheat varieties were emasculated on one side and left to open pollination from surrounding plants of the same variety, the other side being allowed to self-pollinate. The resulting grains developed at more or less the same rate; the seeds from the emasculated florets had thicker integuments, which were also more deeply pigmented. The epi-mesocarp was also thicker and better developed. The endosperm of the crossed grains contained a greater proportion of protein bodies and less fine grained starch, in consequence of which the grains were more vitreous; chemical analysis showed them to be higher in protein content. The greatest difference in protein content was recorded in the variety Spitakaat, where it was increased from 15·56% (dry weight) to 17·78%.

1028. Ščerbina, D. R. 633.11:575.12:575.148
(Effect of intra-varietal crossing and conditions of rearing of the spring wheat TZA/32).
Jarovizacija 1941 : No. 2 (35) : 62–64.
Seeds from intra-varietal crossing in the variety GDS75 gave a yield increase of 1·6 c. per ha. under ordinary conditions of sowing. Crossed seed from the variety TZA/32 gave 22·1 c. per ha. as against 19·8 from uncrossed seed, both grown with a spacing of 25 x 10 cm. The crossed plants were also more resistant to bunt (*Tilletia*), the maximum degree of infection being 40% as against 65% in the uncrossed.

1029. Filipčenko, S. A. 633.11:575.12:575.148:581.143.26.03
(The biological characteristics of seeds resulting from intra-varietal crossing).
Jarovizacija 1941 : No. 2 (35) : 65–67.
Seed from intra-varietal crosses in the winter wheat D.S. 2444/2 eared 15–30 days earlier than uncrossed seed when sown in spring in an incompletely vernalized condition. Those lots which were sown too late for earing were left over the winter and the crossed plants proved to be more winter-hardy, a yield difference of 35% being recorded in their favour.

1030. 633.11:575.127.2:576.356.5
Žebrak, A. R. 633.11:575.129:581.04
(Colchicine induced amphidiploids obtained from the cross *Triticum Timopheevi* x *T. vulgare*).
Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : 92–98.
Hybrids of *T. Timopheevi* with *T. vulgare* varieties inherited the spring habit of *T. Timopheevi*. By pollination with winter wheat the hybrids produced 2 grains, 1 of which gave rise to a mature plant, which on examination proved to have 42 somatic chromosomes. It failed to flower in the first year however and did not survive the winter. In later experiments some 1,600 florets of *T. Timopheevi* were pollinated with *T. vulgare* variety 2411 and 570 florets with the variety Lutescens 62; from the former 411 hybrid grains were obtained and from the latter 87. Many of these grains were treated with colchicine (0·1%) for 12–24 hours and 4 plants were obtained from the former group and 1 from the latter. None of these plants produced grain by open pollination; pollination with Lutescens 62 produced 14 shrivelled grains.
In 1939 a greater range of crosses was made; the hybrid seeds germinated better when *T. vulgare* was used as seed parent. The seeds were again treated with colchicine and this time 10 out of the 12 crosses produced amphidiploids.
By the same method amphidiploids have been produced from *T. Timopheevi* x *T. polonicum*, *T. persicum*, *T. turgidum*, *T. orientale* and *T. durum*.
The characters of the *T. Timopheevi* x *T. vulgare* amphidiploids varied according to the parental variety used. The only one to be examined cytologically had 70 somatic chromosomes. The seeds of the amphidiploids are vitreous and of the *vulgare* type. The plants are spring wheats but ripen somewhat later than *T. Timopheevi*; they are all awnless.

1031. Zakharjevsky, A. 633.11:575.127.2:581.162.5.02
(Control of sterility and the breeding of hybrids of *Tr. Durum* x *Tr. Timopheevi*).
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1941 : No. 2 : 5–9.
The F_1 of *T. durum* x *T. Timopheevi* was sterile when grown under ordinary field conditions. A certain number of plants were grown under intensive manuring, at +1 to +5° C. for 50–60 days (January, February and March) and then in the field, again with high manuring; F_1 plants were grown for 4 successive years under these conditions and each year produced a number of grains. The average number of grains per plant was 3–4, but in 1940 the best plant produced 56 grains. Fertility was still further increased by pollinating with pollen from the later generation hybrids and also to a lesser extent by artificially bursting the anthers in the florets.
F_1 was morphologically intermediate but was equal to *T. Timopheevi* in rust resistance. In the F_2 there appeared forms resembling *T. durum*, *turgidum*, *dicoccum*, *monococcum*, *orientale*, *vulgare*, *T. Spelta* and even *Secale*, with a great range of variation in each type. The fertility

varied in different years from 23 to 50%; the best individual plants gave from 200 to 245 grains. Both rust resistant and susceptible forms occurred.
The F_3 contained a greater range of variation even than the F_2, including some plants with large grains of the cultivated type. The fertility was also higher than in F_2 and some plants bore an exceptionally large number of grains, up to 400 in number. Many of the F_3 plants were fully resistant to rust.
A curious form with pubescent awns appeared for the first time in the F_4; 76% of this generation were rust resistant, and 80% of the plants were constant; only about 4% of sterile plants occurred and 13% had yields in excess of the control. Over 6 kg. of F_4 seed were collected.

1032. TUMANJAN, M. G. 633.11:575.127.2:632.451.2
(Obtaining soft wheats from hard by artificial means.)
Jarovizacija 1941 : No. 2 (35) : 13–18.
The author reports the observation of forms of *T. vulgare* in a number of samples of *T. durum* from Transcaucasia, and points out that the admixture often closely resembles the *T. durum* variety in which it occurs, and crosses with it without difficulty. One plant is described with a strong attack of smut and ears of both types on the one plant. Artificial smut infections were made of ears of a number of varieties of *T. durum*; the F_2 and F_3 progenies contained a number of forms of *T. vulgare* and *T. compactum*. In one plant arising from infected grain, 37 chromosomes were counted in one ear and 31 in another; this plant produced 11 different botanical varieties, 8 of *T. durum* and 3 of *T. compactum*, in its progeny; ordinary forms of *T. vulgare* and one partially sterile speltoid appeared in the following generation, (F_3), where the degree of sterility was less than in the F_2.

1033. SOUDNOV, P. 633.11:575.127.5:581.143.26
(The after-harvest growing of perennial wheat and perennial rye).
Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : 113–14.
Perennial wheat (*Triticum* x *Agropyron*) and rye sprouted better after the first crop of grain when this was cut high than when cut low.

1034. LAPCHENKO, G. D. 633.11:575.127.5:633.289
(Hybrids between Agropyrum and wheat).
Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : 20–33.
Since 1932 *A. glaucum* and *A. elongatum* have been crossed with over 200 different varieties of wheat. Much greater success was obtained in the crosses where wheat served as the seed parent; the set was generally higher in crosses with *A. glaucum* than with *A. elongatum*. Wheat varieties of hybrid origin also tended to give better results than pure line varieties.
All the F_1 plants were perennial and winter-hardy, those from *A. elongatum* being somewhat hardier than the *A. glaucum* hybrids. The hybrids were also extremely vigorous and resistant to drought and diseases; those from *A. elongatum* were tolerant of soil salinity. A certain amount of segregation was observed in morphological details and great variation in fertility, the number of grains per plant varying from 1 to 1,500. The *A. glaucum* hybrids were almost all self-sterile, *A. elongatum* gave 3–5% of self-fertile hybrids.
The F_2 obtained by natural or artificial out-pollination with the parents or later generation hybrids showed wide segregation in both morphological and biological characters, the majority of the plants being intermediate between the parental types; the average number of ears per plant was 10–75 as compared with 100–300 in the F_1 and the vigour and resistance were also correspondingly less; a certain number were perennial and hardy however and survived the winter. The *A. elongatum* hybrids contained a larger proportion of wild types and perennials; these hybrids must be back-crossed at least 2 or 3 times with winter wheat therefore before desirable types can be produced; pollination with the older generation hybrids is also recommended. The number of fertile plants was also less in the *A. elongatum* hybrids (54·8%) than those of *A. glaucum* (81·7%).
The third generation was not inferior to the second in resistance to frost and diseases and in vigour; the number of perennials was less; the majority of the plants were self-fertile, especially in the *A. glaucum* cross. The grain of many of the hybrids was indistinguishable from wheat grain.
The fourth generation was still further reduced in tillering, number of perennials, root development and disease resistance but was very winter-hardy and fertile and had ears and grains mostly of the wheat type; both constant and segregating families appeared.

All plants in the intermediate group are distinguished by lax ears, resistance to frost, drought, diseases and lodging and many of them are perennial. The rachis is tough and the grains do not shed; the grain is intermediate in type, with a thousand corn weight of 20–40 grm.; its gluten content is twice that of winter wheat. The yield is equal to that of winter wheat in good years and greater in unfavourable years. This group is thought to be very promising for localities with severe winters, and 500 different numbers are now undergoing trials.
The wheat-like group is on the whole less resistant to frost and diseases but some forms survived the Moscow winter better than the hardiest winter wheat (98% survived as against 30·3% for Lutescens 0329); they also surpassed the best winter wheats in disease resistance and in baking quality; many of them are also more resistant to lodging. Eight selections are being further investigated; the most promising is No. 599, the parentage of which is {[(Erythrospermum 46/131 x *A. glaucum*) x Erythrospermum 46/131] x selfing} x selfing. It has a large white ear with awns, large red grain, ripens 2–3 days after Moscow 2411, which it exceeds greatly in frost resistance, having given a survival in 1938/39 of 98% against 12·3% in Moscow 2411. It is also resistant in practice to leaf and stem rust and to bunt and smut, shedding and lodging; its 1,000 grain weight = 41–43 grm.

1035. Widenin, K. F. 633.11:575.127.5:633.289:575.42
(**Annual wheat x *Agropyron* hybrids**).
Vestnik Gibridizacii (Hybridization) **1941** : No. 1 : 111–12.
Triticum-Agropyron hybrids obtained from N. V. Tzitzin segregated in respect of yield, resistance to smut and grain characters and selections have been made of the most promising lines.

1036. 633.11:575.3"793"
Tikhonov, P. M. 633.11:581.46:575.3
(**Genetical heterogeneity of the different stems of a hybrid**).
Jarovizacija **1941** : No. 3 (36) : 106–08.
Seed from the winter wheat Erythrospermum 296 crossed with Thatcher spring wheat was sown in late July and ripened at the end of September. The F_1, which is usually awnless, was bearded and no segregation was observed for awn production in either F_2 or F_3, all of which were bearded too. The F_2 showed variations in time of maturity but contained no purely winter forms. It is concluded that the conditions under which the plants developed had affected their hereditary constitution in this respect.
Some of the hybrid seed was kept and sown on 3rd June, together with the spring parent. The parent eared on 15th July but one F_1 plant eared only on 2nd August; the plant was very vigorous, bore 5 ears, 2 of which however bore no grain. In this case the ears were nearly awnless; the F_2 segregated into awned and awnless. The progeny of the 1st ear contained 11 winter forms among 51 plants, the progeny of the 2nd ear 1 among 28 and that of the 3rd ear contained no winter forms.

1037. Câmara, A. 633.11:576.356:537.531
Roturas dos cromosomas provocadas pelos raios X. (**Chromosome ruptures caused by X-rays**).
Rev. Agron., Lisboa **1941** : **29** : 96–97.
Root tips of *Triticum monococcum* L. var. *vulgare* Körn. were irradiated with doses of 1,000, 2,000 and 3,000 r. The zones close to the centromere and distal regions very near the extremities showed the greatest tendency to rupture.

1038. Dolgušin, D. A. 633.11:581.143.26.03:575.12
(**"Odessa 13"**).
Jarovizacija **1941** : No. 3 (36) : 32–37.
By the method of crossing parents of complementary phasic types Lysenko produced the spring wheat 1163 in 2½ years and though not in every respect perfect this variety is still the best in the Odessa region. The principle involved is as follows:—some varieties which are normally unsuitable for a given region give excellent results when vernalized. Such forms are crossed with the forms that give the best results when grown without vernalization but with increased length of day and produce in their offspring forms that are adapted to the conditions in question.

Among the varieties that gave the best results in the Odessa region when sown in spring after vernalization was No. 7626/1. This variety was crossed in 1933 with the standard, 062; and the F_1, sown in boxes, was ripened off in the greenhouse. The F_2 was spring sown in the field; seed from the best plants was sown the same autumn and seed from the most constant plants sown again the following spring. One family had large grains, small ears, awned but of the drought resistant type and when sown in the spring of 1938 it outyielded both parental forms and also 1163; it had proved highly resistant to drought and to Hessian fly; also to brown rust and smuts. Its grain is of good quality. During its multiplication, the new variety, named Odessa 13, has been subjected to intra-varietal crossing.

1039. Sorokin, K. A. 633.11:582.02:581.45
(Variability in characters of glume of wheat).
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1941 : No. 10 : 8–12.

The influence of nitrogen and water content of the soil on the length of the glume tooth was studied in two varieties of winter wheat, Stavropol'ka 0328 and Krasnodarka 622/2. The effect of humidity was invariably more pronounced in the latter variety than the former, while the effect of nitrogen was more pronounced on the former variety.

1040. Sakalo, V. D. 633.11–1.8
(On the causes of different response of spring wheat varieties to fertilizers).
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1941 : No. 2 : 10–14.

A double dose of NPK reduced the grain yield in Lutescens 062 but increased it in Melanopus 069. Thus *T. durum* evidently requires a stronger concentration of soil nutrients than does *T. vulgare*. Even a quadruple dose did not depress the yield of Melanopus 069 but increased it still further. The greater manurial requirement of this variety is partly accounted for by its having a less well developed root system.

1041. Mal'zev, T. S. 633.11–1.813–1.521.6(47)
(Paper read at the Narkomzem board meeting).
Jarovizacija 1941 : No. 2 (35) : p. 148.

It is reported that by treating seedlings of the wheat variety Milturum 0321 with salt solutions at various stages of development it was possible to produce a strain that would grow on saline soils.

Crosses between spring wheats grown in different places are to be made by free pollination so as to make use of selective fertilization.

1042. Oláh, L. 633.11–2.111–1.521.6:575(43.91)
Hogyan lehetne a bánkúti búzák fagyállóságát megjavítani. (**On the possibility of improving the winter-hardiness of Bánkut wheat).**
Rep. Hung. Agric. Exp. Sta. 1939 : **42** : 235–40.

The origin of the Bánkut wheats, which are less winter-hardy than other Hungarian wheats, is not exactly known. They are derived either from a cross of a Hungarian winter wheat with a Canadian spring form or from a selection from a population of the Canadian spring wheat Marquis. They also show a tendency to shoot without any preliminary stimulation by freezing and this feature the author believes to be associated with winter-hardiness and suggests that selection of plants with the above tendency should be used to eliminate the less hardy types. To achieve this, sowing should be postponed in Hungary till the beginning of August so that the so-called summer types may reveal their presence, after which the plants retained can be used to obtain seed.

1043. Luk'janenko, P. P. 633.11–2.111–1.521.6:575.127.2
(The influence of the maternal form on the winter hardiness of interspecies hybrids of wheat).
Jarovizacija 1941 : No. 3 (36) : 99–101.

F_1 hybrids of winter forms of *Triticum vulgare* x spring forms of *T. durum* were all found to be hardier than the reciprocal hybrids. When pollen of the hybrids was back-crossed on the winter *vulgare* parent the offspring were much hardier than in back-crosses on to *T. durum*. The conclusion is reached that winter-hardiness is inherited independently of the chromosome complex.

1044. KARGOPOLOVA, N. N. 633.11–2.451.3–1.521.6:575.12:575.148
(Intra-varietal crossing and the increase in spring wheats of resistance to smut).
Jarovizacija 1941 : No. 3 (36) : 67–69.

Over 19% of the families of the spring wheat Tulun ZA/32 obtained by intra-varietal crossing showed less than 5% infection, whereas only 1·8% of the uncrossed lines gave such a low infection; over 60% of the crossed families gave less than 15% infection and can be regarded as practically resistant. The maximum infection was 40% in crossed plants and 65% in uncrossed.

The experiment was repeated in the following year and gave similar results. In the variety Garnet 25% of the crossed families were entirely free from infection, as opposed to 6·8% in uncrossed lines; 64% of the crossed families were below 5% infection, as against 29% in uncrossed and the maximum infection in crossed families was 15 against 35%.

The crossed material proved more uniform in character and type than the uncrossed lines.

1045. VALLEGA, J. 633.11–2.452:576.16:631.521.6(83)
Razas fisiologicas de *Puccinia triticina* y *P. graminis tritici* comunes en Chile. **(Physiological races of *P. triticina* and *P. graminis tritici* common in Chile).**
Bol. Téc. Minist. Agric. Dep. Genet. Fitotec., Santiago 1942 : No. 3 : Pp. 32.

Specimens of wheat attacked by rust were sent from Chile by air to the Santa Catalina institute in Argentina where the races of *P. graminis* and *P. triticina* were investigated. Data are given on the distribution of the races. The 4 races of *P. graminis tritici* found were the same as those reported in 1938; this parasite therefore seems to be relatively constant and new races do not apparently arise in the country; plants of *Berberis* species with aecia of *P. graminis* have been observed however in Peru, which may therefore be a possible source of infection.

In *P. triticina*, in addition to races 15 and 68, a new race, named 114, has been found, to which only 1 out of the 8 differential hosts is resistant, namely Hussar. All the Chilean races of *P. triticina* differ from those found in the Plata region and the problem of creating resistant varieties will be quite different in the two zones.

Tests of the wheat varieties commonly grown in Chile showed all of them to be susceptible to at least one of the races of *P. graminis* discovered; the hybrid Heines Kolben x 38 M.A. from the Santa Catalina institute is resistant to races 14, 11 and 17, and Corazón de María is mildly resistant to all 4 races, including the most virulent, race 15; this variety is also resistant to the commonest race of *P. triticina*, No. 68, no variety being resistant to all 3 races. Hybrid Heines Kolben x 38 M.A. is also resistant to *P. glumarum* and that and Corazón de María are thought to be the most promising *Triticum vulgare* varieties for breeding purposes.

1046. *OLÁH, L. 633.11–2.452–1.521.6:575.11
A búzafajták rozsdaellenállóképességének átöröklése. **(The inheritance of rust resistance of wheat varieties).**
Rep. Hung. Agric. Exp. Sta. 1939 : **42** : 203–34.

The work of Nilsson Ehle, Engledow, Biffen, Armstrong, Isenbeck and others on resistance to *Puccinia glumarum* in wheat is reviewed. The author's experiments were conducted to investigate (1) whether resistance is conditioned by a series of multiple allelomorphs and, if not, whether it is mono- or poly-factorial; (2) the role of the plasma, if any [No mention is made of this aspect in the results given in the present paper]. Conditions of temperature, humidity and light were controlled and two biotypes of the fungus, No. 9 and No. 7 were used for the infection of hybrids Michigan Amber x Carstens Dickkopf, Michigan Amber x Heines Kolben and Carstens Dickkopf x Heines Kolben. The author admits that from his experiment as planned it would be impossible to determine whether a multiple allelomorph series or gene linkage was operating, but adds that both will produce identical effects, hence the point is not of practical importance. The F_2, F_3 and, in some cases, the F_4 were studied. The technique used is described in full.

All crosses showed polymeric segregation for resistance to each of the biotypes, but the individual crosses differed in the degree of dominance shown.

The cross Heines Kolben x Michigan Amber gave the largest number of plants resistant to

* An abridged translation of this paper is on file at the Bureau.

No. 7, while Michigan Amber x Carstens Dickkopf gave the minimum and Carstens Dickkopf x Heines Kolben occupied an intermediate position. With biotype No. 9 the Michigan Amber x Carstens Dickkopf showed the maximum number of resistant plants and Heines Kolben x Michigan Amber the least. Carstens Dickkopf therefore transmits susceptibility to No. 7 more dominantly than Michigan Amber and Heines Kolben transmits susceptibility to biotype No. 9 more dominantly than Michigan Amber.
Resistance to the two biotypes appears to be independently inherited; but as a consequence of free combination of factors, even in F_3 forms resistant to both biotypes are to be found.
Evidence of the modifying effect of low temperature in rendering resistant plants susceptible was also obtained in the Carstens Dickkopf x Heines Kolben cross.
On the basis of the literature and also the present experimental results, the author suggests that resistance is not inherited uniformly and identically but in a simpler or more complicated manner according to the parent variety used in crossing and even the same variety may segregate monomerically or dimerically for resistance to one biotype and possibly polymerically for resistance to another biotype.
In spite of the absence of evidence for a multiple allelomorph basis of resistance in the present crosses, the possibility of such a basis in other varieties remains an open question.
The complex character of resistance calls for consideration of the physiological and environmental influences affecting the nutrition and development of the plant and indirectly its disease resistance. For this reason large numbers of plants are essential in any genetic study of resistance.

1047. Luk'janenko, P. P. 633.11–2.452–1.521.6:575.12
(**Methods of breeding of winter wheats resistant to brown rust**).
Jarovizacija 1941 : No. 3 (36) : 38–47.

Data are cited from the literature to show that many rust resistant varieties lose their resistance after a number of years. This is sometimes due to a change in the physiological races of the parasite, as in Krasnodar where race 66 of *Puccinia triticina* appeared in 1939. Resistance is also very much influenced by environmental conditions. Varieties showing seedling and mature plant resistance are classed as R_1, those with mature plant resistance only as R_2, those that are susceptible throughout life as S_1 and those that are more susceptible as seedlings than as mature plants S_2. Crosses were made between representatives of these various types in various combinations. Resistant progenies were obtained only in crosses of types $R_1 \times R_2$. Crosses of two varieties belonging to the same resistant type gave no resistant offspring. Type R_1 crossed with susceptible varieties also gave a certain amount of resistance in the progeny. Hybrids of the $R_1 \times R_2$ type such as (Kanred x Fulcaster 266287) x Ferrugineum No. 622 and x Klein 33 greatly surpassed both parents in resistance and retained their resistance up to full maturity. The best of the hybrids have exceeded the standard varieties in hardiness and yield as well as rust resistance.
In making these crosses for breeding purposes it is important that one of the parents should be a local variety adapted to the conditions of the region for which the breeding is carried out. Especially good results have been obtained by using the Banat wheats, the hybrids of which are very high in quality.

1048. 633.11–2.452–1.521.6:581.143.26
Straib, W. 633.52–2.452–1.521.6:581.143.26
Die Feststellung der Rostresistenz beim Getreide und Lein. (**Determination of rust resistance in cereals and flax**).
Forschungsdienst 1942 : **13** : 24–29.

Observations on some 1,500 wheat varieties in a number of successive years in the field have shown that many varieties which in the seedling stage are susceptible to yellow rust show marked resistance in the mature plant stage, this resistance being unaffected by differences in the physiological races of the parasite. The variety Criewener 104 possesses marked mature plant resistance, in contrast to Michigan Amber, which is susceptible, though both varieties show the same degree of susceptibility in the seedling stage. Several others of the old German varieties have proved to be resistant in the field owing to the possession of this mature plant resistance and field tests of all breeding material are now being made in addition to seedling inoculations in the greenhouse.
Mature plant resistance has been observed also in many varieties of flax.

1049. Novitskii, A. 633.11–2.7–1.521.6(47)
(A promising variety of spring wheat).
Sotsialističeskoe Sel'skoe Khozjaistvo (Socialistic Agriculture) Moscow 1941 : No. 2 : p. 88.
The new variety of spring wheat Artemovka 01418, a selection from a local wheat of the Don basin, has outyielded the standard, Lutescens 0·62 by 0·6 to 3·6 c. per ha.; it is resistant to Hessian fly and is superior to 062 in baking quality.

1050. Jones, E. T. 633.11–2.7–1.521.6(78.1)
A discussion of Hessian fly resistance in certain wheat varieties.
Trans. Kans. Acad. Sci. 1940 : **43** : 243–65.
A record of 12 years' study in Kansas of the factors affecting resistance to *Mayetiola destructor* Say in susceptible and resistant varieties of wheat. Among the factors promoting resistance was the greater pressure and rigidity of the tissues of resistant varieties leading to the death or abnormal development of the larvae. The same result could also be produced by a stiffening of the plant due to deficiency of moisture in the soil, causing hardening and tightening of the leaf sheaths.

1051. Wagner, S. 633.11:664.641.016:575(49.4)
Qualitätsprüfungen an Winterweizen. (**Quality tests with winter wheat**).
Landw. Jb. Schweiz 1941 : **55** : 739–72.
Tests were carried out at various centres in Switzerland to determine the milling and baking quality of the three Italian wheats, Mentana, Ardito, Villa Glori, the new Mont Calme 245 (bred at the Mont Calme (Lausanne) Seed Control Station), the new variety Alpha of the Zürich Oerlikon Experimental Institute and the Canadian wheat Kharkov.
Hectolitre weight was found to be a varietal character but not, it is suggested, a very stable one, as its effects may be easily masked by any great variation in environmental conditions.
In the milling quality tests the superior varieties, Kharkov, Alpha and Plantahof (used as control in German speaking parts of the country) show a very high diastatic activity.
In gluten quality the same three varieties again surpassed the others, Kharkov again ranking first.
Farinograph tests were also made and composite farinograms typical of each variety were constructed from 15 diagrams using the typical varietal characteristics of the curves.
In general the findings reached by the indirect baking value tests were confirmed in baking tests.
The main quality characteristics of the various wheats are tabulated and a short survey is given on the winter hardiness, yield and earliness of the varieties based on observations from experiments not carried out by the author.

1052. Gruzl, F. 633.11:664.641.016:578.08
A búza, illetöleg a liszt minöségének és minösitésének alapelvei. (**Principles of grading and valuation of wheat and flour**).
Rep. Hung. Agric. Exp. Sta. 1939 : **42** : 1–10.
On the use of Hankóczy's farinograph, Brabender's extensograph and the fermentograph in determining the various component factors of quality of wheat and flour.

1053. Holzwarth, F. 633.11:664.641.016:578.08:007
Hankóczy Jenö 1939.
Rep. Hung. Agric. Exp. Sta. 1939 : **42** : 298–301.
An appreciative notice of the work of the late Dr. J. Hankoczy, the inventor of the well-known farinograph.

1054. André, H. d' 633.11.00.14(82)
La calidad industrial de los trigos provenientes del ensayo "standard" conducido por la red oficial de ensayos territoriales, en la region cerealera Argentina, cosecha 1939–1940. (**The industrial quality of the wheats from the standard test carried out by the official variety testing service in the cereal region of Argentina. Harvest 1939-40**).
"Granos" Semilla Selecta, B. Aires 1940 : **4** : Nos. 9–10 : 3–25.
Tabular data are given in respect of yield and quality for a number of varieties grown in

6 different zones of the Argentine Republic. The varieties with the best performance include Klein-Otto Wulff, Sinvalocho M.A. (see "Plant Breeding Abstracts", Vol. XII, Abst. 129) Klein 66 and Klein 33.

1055. Elgueta, G. M.,
Cortazar, S. R.,
Letelier, A. E. and
Coronel, C. A. 633.11.00.14(83)
Informe preliminar sobre investigaciones culturales en trigo 1940–1941. **(Preliminary report on cultural investigations with wheat 1940-1941).**
Bol. Téc. Minist. Agric. Dep. Genet. Fitotec., Santiago 1941 : No. 1 : Pp. 99.
The investigations included tests of 95 varieties, records being made of the date of germination, earing and maturity, yield and rust attack at a number of different stations. In the north of the country the best yields were given by the varieties most resistant to *Puccinia graminis*, and in the centre by those resistant to *P. glumarum*.

BUCKWHEAT 633.12

1056. Gluščenko, I. E. 633.12:575.12
(The retention of typical varietal characters of buckwheat after inter-varietal pollination).
Jarovizacija 1941 : No. 2 (35) : 68–75.
Varieties of buckwheat differing in morphological type were sown in adjacent rows 25 cm. apart. The resulting seed sometimes germinated earlier than original uncrossed seed and the resulting plants were often taller and more vigorous. In morphological type, flower colour and seed type the crossed plants however showed little difference from the respective maternal forms, except that the proportion of large seeds was higher. The seed yield was also greater.

1057. Kobel'kov, V. V. 633.12:575.12
(The effect of free pollination on the yield of buckwheat).
Jarovizacija 1941 : No. 3 (36) : 120–21.
Seven varieties of buckwheat were grown in juxtaposition and all gave yields in excess of those from "original" seed; the differences varied from 16 to 46%. No effect on the varietal type was observed.

1058. Kopel'kievski, G. V. and
Mikhailov, K. N. 633.12:575.257
(Experiments on the vegetative hybridization of buckwheat).
Jarovizacija 1941 : No. 2 (35) : 111–14.
Common buckwheat was grafted on to *Fagopyrum tataricum* and *Polygonum Weyrichii*. The seeds formed differed from those of the common buckwheat. Seedlings from these seeds were more vigorous than the untreated controls and bore seeds displaying characters associated with both parents; out of 77 progenies examined, 52 yielded more seed than the control and only 4 yielded less. It is hoped by selection among them to produce more drought resistant forms.
A number of grafts were made between cultivated varieties. French buckwheat grafted on to Japanese buckwheat showed an increase in seed size. In other grafts the colour and external morphology of the seed were altered. The changes were transmitted to the first seed generation.

OATS 633.13

1059. Dungan, G. H.,
Bonnett, O. T. and
Burlison, W. L. 633.13:575(77.3)
Spring oat varieties for Illinois.
Bull. Ill. Agric. Exp. Sta. 1942 : No. 481 : 443–71.
It is shown that during the last 45 years an increase in yield per acre of 12·6 bushels has been effected by the breeding of improved varieties. Descriptions are given of some of the best varieties for the different parts of the state, with remarks on their origin, resistance, grain, straw and groats yield.

The methods of improvement by breeding are outlined, with special emphasis on the breeding of disease resistant hybrids.
Marion has given the highest average yield of grain and of groats, though it is exceeded by some of the newer selections from Victoria x Richland.

1060. SWENSON, S. P. 633.13:575(78.3)
Miomark oats.
Circ. S. Dak. Agric. Exp. Sta. 1941 : No. 32 : Pp. 4.
The new oat known as F40 has now been named Miomark and distributed. It was developed by back-crossing a selection of the cross Iogold x Markton to Markton. Miomark is resistant to the local races of loose and covered smuts and of stem rust in Dakota; it is more vigorous in growth than Richland or Iogold and matures 2–4 days after Richland, which it has out-yielded by 9% in the whole S. Dakota State.

1061. ÅKERMAN, A. and
FRÖIER, K. 633.13:575.11.061.633
Die Faktorenverteilung der *lutescens*-Sippe von *Avena sativa* auf die Elternsorten. (**Distribution of factors of the *lutescens* strain of *A. sativa* in the parent varieties**).
Hereditas, Lund 1942 : **28** : 171–76.
The *lutescens* strain obtained by Åkerman in crosses between Abed's Nova oats and middle-Swedish black oats contained 3 factors for chlorophyll deficiency. Crosses of monofactorial heterozygotes, which can be distinguished from normal greens in the 3–4 leaf stage, with Glockenhafer II (Bell II) indicated that the black oat parent was monofactorial and Abed's Nova bifactorial.

1062. MÁNDY, G. VON 633.13:582(43.91)
Beiträge zur Morphologie einiger gezüchteter Hafersorten Ungarns. (**On the morphology of certain oat varieties bred in Hungary**).
Züchter 1942 : **14** : 65–73.
Data are given on vegetation period and rhythm, haulm and leaf characters, spike characters and yield in 7 Hungarian oat varieties. Keys for the identification of the varieties are provided. The variety Fleischmann was the best in grain yield.

1063. 633.13–2.6–1.521.6:575(43)
GOFFART, H. 633.1–2.6–1.521.6:575(43)
Untersuchungen am Hafernematoden (*Heterodera schachtii*, Schm.) unter besonderer Berücksichtigung der schleswig-holsteinischen Verhältnisse. II. [**Investigations on the oat nematode (*H. schachtii*, Schm.) with special reference to Schleswig-Holstein conditions. II.**].
Arb. biol. Reichsanst. Land- u. Forstw., Berl. 1941 : **23** : 141–61.
The biology of the parasite and its effect on the plant are discussed. The problem of breeding resistant oats has made a re-examination of the varietal reaction necessary, particularly in view of the possible existence of biological specialization. Tests of a number of varieties were made in the laboratory and in the field in four successive years, using the same strain of the nematode and a control of Siegeshafer. Both Adler and Heines Silber were less severely attacked than other varieties and gave significantly higher yields when grown in infested soil. Varietal differences in resistance have also been detected in spring barley but not so far in spring wheat.
The influence of various cultural measures on nematode attack is discussed. Winter oats seem to suffer less than spring oats.

RYE 633.14

1064. ŽUKOV, I. 633.14:575.12(47)
(**Breeding winter varieties in the eastern regions of the U.S.S.R.**).
Jarovizacija 1941 : No. 2 (35) : 149–50.
Volunteer rye plants growing on old plots of land were used as initial material for breeding and led to the production of Dolinska rye, which has proved one of the hardiest and most productive ryes in Kazakstan. Further improvement has been effected by free pollination in the vicinity of a number of other varieties.

1065. LEVAN, A. 633.14:576.356.52:576.354.4
Studies on the meiotic mechanism of haploid rye.
Hereditas, Lund 1942 : 28 : 177–211.

Three haploid plants of rye were studied in detail; root chromosomes of these and certain other haploid ryes all showed the normal rye idiogram; data on chromosome dimensions and form are presented; some of the features of the haploids, such as the occurrence of several satellited chromosomes, were observed in diploid roots that had been subjected to cold treatment.

At meiosis pachytene pairing of the chromomeres was observed between the non-homologous chromosomes, though frequently the pairing was interrupted before being completed; this pairing was by coiling and is styled "residue pairing." Bivalents and trivalents were formed, though in very variable numbers in different cells and in different plants; in two of the haploids chiasmata were formed fairly frequently but the third behaved as a characteristic haploid. The bivalents were as a rule symmetrical and reacted normally to the spindle, the univalents proceeded directly to the poles. The occurrence of bridges with and without fragments was observed at anaphase.

The second division was very irregular; chromosomes with double and with single chromatids occurred, together with certain telocentric chromosomes arising from misdivision. Tetrads of 4 cells were most commonly formed but dyads and monads also occurred; tetrads usually contained 1 nucleolus in every cell, showing that other chromosomes than s_1 may develop a nucleolus.

The body of the plant often contained cells with the diploid or tetraploid chromosome number; in two cases this affected the pollen sac and giant pollen cells were produced; chiasma formation was very low in these doubled sectors, as in inbred rye.

The implications of these findings, and especially of the chiasma formation in non-homologous chromosomes, are discussed. The view that *Secale* is a secondary diploid with an original chromosome number of 5 is held to be improbable and an evolution involving numerous small changes seems more likely.

1066. RUDNITSKII, N. V. and GLUKHIKH, K. A. 633.14:581.162.32:575.12
(Inter-varietal cross-pollination in rye).
Jarovizacija 1941 : No. 2 (35) : 35–42.

With a wind velocity varying from 1 to 9 m. per second rye pollen could travel in small amounts up to a distance of 1,600 m., at 2 m. above the ground, and up to 800 m. at 9 m. above the ground. Isolation of 1 km. is thus not an absolute protection against cross-pollination. The pollen grains lost their germination capacity entirely after 24 hrs. in the open air; it fell sharply even after 3–4 hrs. Unpollinated stigmas retained their receptivity for 10–14 days. The white grained variety P–13 was pollinated 1) with pollen from the same variety, (2) with a mixture of pollen of P–13 and Vjatka and (3) with a mixture of P–13 and Avantgarde. Treatment (1) and (3) gave exclusively white grains, whereas Treatment (2) produced 12·5% of green grains characteristic of Vjatka. With open pollination P–13 produced a higher proportion of green seeds. The proportion of green grains rose with each generation of open pollination, reaching 62·2% in the 3rd generation. In Vjatka grown in propinquity with P–13 the number of white grains rose, although not to such a pronounced degree. Changes in colour were associated in P–13 with changes in grain shape and type of ear but in Vjatka these changes were scarcely detectable.

Cross-pollination resulted in an increase in tillering, grain weight and yield and though P–13 showed a greater yield increase than Vjatka, the latter variety, without materially altering its morphological characters, was quite definitely improved.

MAIZE 633.15

1067. JENKINS, M. T. 633.15:575(73)
Reports of the Fourth and Fifth Corn Improvement Conferences of the North Central Region.
Washington, D.C. February 18, 1942 : Pp. 91. (Mimeographed).

The Connecticut report emphasizes the importance in selecting inbreds for combining ability, and discusses various technical points.

Illinois reports the results of various complex crosses and different combinations of both yellow and white maize. The value of different inbreds for producing disease resistance hybrids

is being studied, with particular reference to *Diplodia* stalk rot, smut and ear rots; also insects, including ear worms, chinch bugs, leaf aphids and root worm.
Indiana describes its breeding methods, system of numbering the hybrids, sweet corn and popcorn hybrids, and work on resistance of inbred lines and hybrids to physiological races of *Helminthosporium maydis*.
In Iowa the breeding material is tested in all the areas for which it is designed; synthetic 16 line varieties showing great promise have been produced.
In Kansas over 1,000 double crosses have been made since 1938 and seed of 10 promising hybrids has been made available to farmers; many growers are now producing certified seed.
In Kentucky about 25 promising crosses have been produced.
Michigan has greatly increased its area under hybrid corn, all seed sold being of single crosses.
Minnesota has released a number of new hybrids all resistant to smut and lodging, adapted to different maturity zones. The method of convergent improvement has produced lines definitely superior to the original form of the recurrent parent; a portion of the genotype of the non-recurrent parent was retained with ease by selection in the 1, 2, 3 and 4 year back-crosses; some recovered lines yielded as well as the original F_1. Two or three generations of back-crossing were found sufficient to recover the genotype of the recurrent parent.
Missouri is testing large numbers of both yellow and white double crosses.
The Nebraska Experiment Station has adopted the principle of determining the combining ability of inbred lines through their performance in top crosses. Only the more promising double-cross combinations are actually made.
In North Dakota breeding is confined to early open pollinated varieties. Many lines have been discarded on the basis of susceptibility to smut and firing. Tests of a number of selected double-crosses are also in progress.
Ohio is intensifying in fewer lines the desirable characters already isolated. Classification is being made according to *Helminthosporium*, smut, aphid and borer attack. The standing ability of the hybrids is greatly improved.
Oklahoma has made a number of successful selections and top crosses.
South Dakota is making studies on drought and disease resistance, yielding and combining ability. The low protein selections now average 8·2% and the high protein 20%.
The United States Department of Agriculture reports that the double-cross hybrid Iowa 13 has been reconstituted after first crossing each of the four parental inbred lines with one or more lines that corrected their most serious weaknesses. All but 2 of the 24 new modifications tested outyielded Iowa Hybrid 13, some very significantly. Crossing work with many other lines is in progress.
Wisconsin work includes special attention to second cycle lines, evaluation of resistance to stalk rots, smut and corn aphis, ability to germinate at low temperatures, and suitability for silage. Special studies are being made on the waxy gene.
The policy regarding the certification of hybrids and parent stocks and release of inbred lines and tables of recommended hybrids are given for the different states.

1068. Bascialli, P. C. 633.15:575.12
La producción de semillas de híbridos comerciales de maiz. (**The production of seeds from commercial maize hybrids**).
"Granos" Semilla Selecta, B. Aires 1940 : 4 : Nos. 9–10 : 26–28.

The advantages of hybrid maize and the various methods for producing hybrid seed on a commercial scale are described—top cross, simple, three-way and double-cross.

1069. Copper, R. R. et al 633.15:575.12(77.3)
Eighth annual Illinois corn performance tests 1941.
Bull. Ill. Agric. Exp. Sta. 1942 : No. 482 : 475–527.

Hybrid corn represents 87% of the total corn acreage in Illinois and a record yield of 82·9 bushels an acre was obtained. The bulletin gives the results of tests on 348 hybrids and 14 open pollinated varieties. Full data are given on rootworm and disease attack, standing capacity and yield. Some of the hybrids yielded less than the average of the open pollinated varieties and the 5 best hybrids exceeded the 5 poorest by 16·5 bushels per acre. The 1941 results compared favourably with those for the previous 5 years.
The pedigrees of the hybrids included in the tests are given.

1070. WAGENAAR, G. A. W. 633.15:575.42(92)
Massaselectie bij maïs. (**Mass selection in maize**).
Landbouw 1941 : **17** : 307–13.

The maize varieties grown in the Netherlands East Indies are actually populations which should be subjected to systematic selection to maintain their purity, with, however, due care that the yield does not become detrimentally affected by excessive inbreeding. Owing to the need for such measures and lack of space, the number of maize varieties undergoing selection at Buitenzorg was relatively small until in recent years plots were established for maize selection at Ngale, Modjosari, Moeneng and other places. In addition, however, to hasten the production of good varieties for growers a system of local selection has been started on the various seed farms in important maize districts. In this work mass selection on American lines is being used.

Its technique is described with full details of the criteria in selective thinning and selective harvesting and for judging yield and quality.

The production of élite seed and the registration of seed for issue to growers are explained in detail.

1071. KIRIČENKO, E. G. 633.15:581.46:575.42
(**Selecting maize for low and high weights of core in the cob**).
Jarovizacija 1941 : No. 3 (36) : 70–73.

Measurements made on 200 plants of Brown County maize showed that the percentage of core in the different cobs varied from 8 to 32%, the variations being largely independent of the actual weight of the cob. Two groups of 8 cobs each were selected, one with low core, from 12·7 to 14·8%, the other with high, 20 to 27·5%; in size the cobs of the two groups were as nearly as possible equal. The seeds of the two groups were sown separately, with 200 m. isolation. Each family was harvested separately. There was a difference of 3·62% in the core content between the high and low selections. The families with the greatest deviations were again selected and in the second generation the difference between the two groups was 4·3%.

1072. KEMPTON, J. H. and
McLANE, J. W. 633.15:581.481:575.125
Hybrid vigor and weight of germs in the seeds of maize.
J. Agric. Res. 1942 : **64** : 65–80.

After reviewing some of the literature on hybrid vigour, the authors present some varied data bearing on germ weights, from which they draw the following conclusions. Hybrid vigour can be detected in most crosses but not in all by an increase in germ weight. The (geometric) rate of increase in germ weight before dormancy is of the same order as that immediately after germination. Hybrids showing heterosis have a higher rate of increase of dry weight than their parents in the early, but not in the later, stages of growth. Seeds differing mainly in respect of endosperm characters (starchy or sweet, horny or waxy, flinty or floury, blue or red, yellow or white) had different germ weights. J. L. F.

1073. STRINGFIELD, G. H. and
BOWMAN, D. H. 633.15–2.451.2–1.521.6:575.12
Breeding corn hybrids for smut resistance.
J. Amer. Soc. Agron. 1942 : **34** : 486–94.

The work contains tables of percentage infection by smut (*Ustilago zeae*), lodging, and acre yield of four commercial hybrids adapted to northern Ohio compared with five open-pollinated varieties adapted to the same area. The hybrids combine a high degree of smut resistance with other desirable agronomic characters.

1074. HUBER, L. L. and
STRINGFIELD, G. H. 633.15–2.7–1.521.6:519.241.1
Aphid infestation of strains of corn as an index of their susceptibility to corn borer attack.
J. Agric. Res. 1942 : **64** : 283–91.

The aphid susceptibility of a number of inbred lines, single crosses, double crosses and the open-pollinated variety Woodburn were determined. The data suggest that susceptibility to the corn leaf aphid is determined by hereditary factors. The susceptibility of lines to the aphid (a sucking insect) was found to be correlated with their susceptibility to corn borer (a chewing insect) and it is suggested that aphid infestation, which is easily estimated, can be used in breeding work as a measure of borer susceptibility H. W. H.

1075. GUSTAFSSON, A. 633.16:575.242:537.531
Mutationsforschung und Züchtung. (**Mutation research and breeding**).
Züchter 1942 : **14** : 57–64.

By subjecting resting barley seeds with a water content of 10–15% to very strong X-ray treatment so that very few of the resulting plants reached maturity, plants were produced which, though mostly sterile, produced a great number of mutations in their progeny. Among these, some were fertile and occasionally possessed properties of practical value. Thus in Goldgerste many mutants of the *erectum* type, with short strong straw, have been produced and 11 out of the 12 are now in cultivation; at least 2 of them have equalled or excelled the parent in yield. Other mutants include a six-row form, two winter forms, forms ripening 4–5 days later than the parent, and several ripening a day or two earlier than the parent, some with short strong straw, another with larger grain. The 1,000 corn weight is in some mutants as much as 5% greater. Some of the mutants exceeded Goldgerste in protein content, others in starch content; some had a shorter period of dormancy.

In 1940 ten different mutants were grown under different manurial treatments; most of them proved inferior to Goldgerste in yield, some by as much as 23–30%. One mutant, Erectoides No. 1, was equal to Goldgerste in yield, 1,000 corn weight and protein content but excelled it in standing capacity. Erectoides 3 and Late Mutant yielded more than Goldgerste and had a higher 1,000 corn weight, though they were somewhat later in maturity.

No mutation differed from the parent in a single character alone but all showed a series of differences. Root tips of germinating X_1 seeds showed 70–80% of irregular mitoses.

1076. MÜNTZING, A. 633.16:576.356.5:575.242.061.6
Frequency of induced chlorophyll mutations in diploid and tetraploid barley.
Hereditas, Lund 1942 : **28** : 217–21.

Seeds of Opal 13 barley and of its autotetraploid were irradiated with X-rays. The reduction in fertility and in vigour of the seedlings was less marked in the tetraploid than the diploid; a number of chlorophyll deficiencies were observed in the X_2 generation of the diploid but none occurred in the corresponding generation of the tetraploid. Some of the tetraploids showed yellow spotting as opposed to normal green in the leaves but the condition was not more frequent in irradiated than in untreated material.

There was a proportionality between X-ray dosage and mutation frequency in the diploid for the lower doses and between dosage and sterility for all doses (5,000, 10,000 and 15,000 r.).

1077. SUNESON, C. A. and 633.16:581.162.51:632.484
HOUSTON, B. R. 633.16:581.162.51:632.451.2
Male-sterile barley for study of floral infection.
Phytopathology 1942 : **32** : 431–32.

The male-sterile barley plants referred to by Suneson (cf. "Plant Breeding Abstracts", Vol. X, Abst. 1038) are very useful for mass inoculation with organisms transmitted by floral infection. By dusting the male-sterile spikes with pollen from F_1 hybrid plants heterozygous for the male-sterile factor and then with spores from a leaf killed with *Helminthosporium gramineum* excellent infections were obtained. Similar experiments with loose smut gave rather low infections; among the 30 smutted plants were 5 that produced some disease-free spikes, of which 1 had normal fertility and 4 were male-sterile.

1078. GRAMOLIN, B. A. 633.16:581.46:575.3
(**Changes in the reproductive organs of barley as a result of hybridization and conditions of rearing**).
Jarovizacija 1941 : No. 2 (35) : 19–30.

Various anomalies of development such as duplication of awns, glumes and grains were observed in barley florets in hybrids between geographically distant races. The anomalies were more frequent when the hybrids were grown in the greenhouse with abundant manuring; thus the F_3 contained 50% of anomalous plants in the greenhouse and only 5% in the field; in the F_1 and F_2 anomalies were often absent in the field plants and observed only in the greenhouse. The F_2 from F_1 plants grown in the greenhouse contained a greater proportion of anomalies than the F_2 from plants grown in the field.

Grains from modified and normal spikelets on the same ear were sown separately; both contained in their progenies both normal plants and plants showing varying degrees of anomaly.

The parent plants occasionally displayed certain anomalies of a similar nature but they were much less frequent and of lesser degree.

1079. MYLER, J. L. and STANFORD, E. H. 633.16:581.48:575.11.061.6
Colour inheritance in barley.
J. Amer. Soc. Agron. 1942 : **34** : 427–36.
Breeding experiments with *Hordeum*, in which crosses involving colour differences of pericarp, aleurone and endosperm were made, have shown that blue aleurone is produced by complementary factors not previously reported. Further study on colour inheritance has been made with eleven varieties and information on the following linkage relationships is included: the factor purple pericarp (linked with non-six-rowed vs. six-rowed) is placed in linkage group I; the factor blue aleurone layer (linked with hooded vs. awned character) is placed in linkage group IV; a second factor for blue (linked with hulled vs. naked character) is placed in linkage group III; the factor for white vs. orange lemma is inherited independently of factors representing linkage groups I, III, IV and V.

1080. MARSCHALL, F. 633.16:581.6:575(49.4)
Der Braugerstenbau in der Schweiz. (**Malting barley growing in Switzerland**).
Landw. Jb. Schweiz 1941 : **55** ; 783–802.
In describing the forms and varieties of barley, its origin and the breeding and improvement of malting barleys are mentioned, with examples such as the Heine, Proskowitz and Svalöf varieties which have been derived from the original Hanna barley. The land barleys, which have been much used as a basis for malting barleys, are in general early, hardy, drought resistant, though not very resistant to lodging and have grain of good quality.
The distribution of malting barley in European countries and elsewhere is considered, special attention being given to Switzerland in the past, present and future.
The criteria for grading malting barleys and the measures adopted in Switzerland to improve quality are enumerated.
The old Swiss land barley, Ramsergerste, having proved very difficult to use for malting purposes in bad years, research on the production of a new variety was begun and variety trials were carried out at various centres. So far the results obtained justify the recommendation of the barleys Danubia (early) and Bavaria (high yielding and resistant to lodging), both bred from Bavarian land barleys. The Danish barley Kenia is also recommended but with certain qualifications owing to having been bred for tolerance of heavy nitrogen manuring.

RICE 633.18

1081. ADACHI, T. 633.18:575.11(52)
[**Newly-discovered rice varieties, dwarfish (in unawned Aikoku) and many-leaved (in Loktjan)**].
Plant Breed. News 1935 : 1048–50.
Two unusual types found among rice plants at Konosu Station are described. One was a dwarf form of Mubo (unawned) Aikoku and had short stems and ears, but full ears and large grains; it is regarded as a mutant with possibilities as a ♀ parent in breeding, though itself of no practical value. The other new form was a type with many leaves (34–38 on the main stem) that appeared in the Javanese variety Loktjan also at the Konosu Station. Though unfortunately there had been no definite plan of investigation at the beginning, it seems possible that this type represents the double recessive in a mono-hybrid segregation. Many of the plants showed vigorous tillering from a node high above the soil.

1082. RJABOV, I. E. 633.18:581.143.26.03:575.12
(**Rice breeding according to the theory of phasic development of plants**).
Jarovizacija 1941 : No. 3 (36) : 48–55.
Rice plants growing at the Bezenčuk station were subjected to a 10 hour day for 20 days. Different varieties reacted differently, the time of panicle emergence being hastened in some, by periods varying from 5 to 47 days, and delayed in others, by from 5 to 20 days. The latter group consisted mainly of early varieties, the later varieties being all accelerated by the treatment. Some of the varieties when treated emerged sooner (3–7 days) than the local standard under similar treatment, which shows that in respect of phases other than the light

phase they are better adapted to Bezenčuk conditions. By crossing such forms with those that do not react to reduction in day length (i.e. with short photo-stage) it has been possible to produce forms exceeding in earliness both the parents and the earliest standard variety. Thus in the F_1 and F_2 of the cross Karatal'skii 86–79 (short photo-stage) x Yuk-to rainfed rice (short vernalization stage) forms were found which emerged 6–8 days before the standard, 5–6 days before the earlier parent and 10–14 before the late parent; the hybrids were more robust than the parents and gave considerably higher yields of grain (15·0 to 22·3 c. per ha. as against 10·4 for Santakhezskii 013, the standard). The hybrids are being grown without irrigation in the hope of producing a rain-fed type.

1083. Sreenivasan, A. 633.18:581.6:575
Nutritive value of the protein and mineral constituents of rice varieties.
Cereal Chem. 1942 : **19**. : 36–47.

The growth rates of young rats fed on diets based on different varieties of rice differed according to the protein and mineral contents of the varieties; breeding with these differences in mind is advocated, the phosphorus content being the chief among the mineral differences.

1084. Chambliss, C. E. 633.18–1.524(7).
The botany and history of *Zizania aquatica L.* ("wild rice").
Rep. Smithson. Instn. 1940 (1941) : 369–82.

The plant has for many centuries been used for grain by the American Indians and later by the European settlers. Descriptions are given of the species and of its variants, of the many lakes and rivers where it occurs in large areas and of the use made of it by the Indians.

1085. Kuilman, L. W. 633.18–2.19–1.521.6:581.43(92)
Wortelstudies aan tropische landbouwgewassen. 1. Wortelontwikkeling en vruchtbaarheid. (**Root studies on tropical agricultural crops. 1. Root development and fertility**).
Meded. Alg. Proefst. Landb., Buitenz. 1941 : No. 48 : Pp. 18.

An experimental study of the relations between the type of root development in numerous varieties of rice of the Netherlands East Indies and nutrition on the one hand and soil fertility on the other.

Though the present study dealt mainly with rice, other crops were also considered, e.g. *Arachis hypogaea*, *Glycine Max.* L., *Phaseolus lunatus*, etc.

Incidentally a rather high correlation was found between the resistance of East Indian rice varieties (Oentoeng, Temas, Kloeang, Moering, Skrivimankoti, etc.) to "Mentek" disease and the development of a very finely branched root system.

FORAGE GRASSES 633.2

1086. 633.21:576.356:581.163
Åkerberg, E. 633.21:575.127.2
Cytogenetic studies in *Poa pratensis* and its hybrid with *Poa alpina*.
Hereditas, Lund 1942 : **28** : 1–126.

Studies of twelve strains of *P. pratensis*, some of which have figured in previously published investigations (cf. "Plant Breeding Abstracts", Vol. X, Abst. 152) are here presented in detail. Data are given regarding their morphology, chromosome number and the development of the male gametophyte; meiosis took place in exactly the same way in the sexual strain 709 as in the apomictic strains 701 and 746. There were great differences in the quantitative and qualitative pollen formation of different strains, though both are very much influenced by environment. A correlation was observed between chromosome number and pollen size.

The development of the female gametophyte was studied in 3 of the strains, 1 sexual and 2 apomictic, in which an aposporous embryo sac usually takes the place of the normal one. From a large number of pollination experiments it is concluded that pollination is necessary for ovule development both in apomictic and sexual strains. Data are given for seed setting after isolation and after open pollination, showing that differences exist between different strains of both the apomictic and the sexual types. Variation between the strains was observed also in seed weight, seed germination after storage, and in the extent of polyembryony, 2, 3, 4 and up to 5 seedlings per seed being obtained at times.

The progenies of the 2 sexual strains were examined, both after selfing and crossing, and considerable variation was observed in morphological features and chromosome number. Of the progeny of the apomictic strains, 89% were identical with the parents, the remainder being either hybrids with *alpina* or haploid, diploid or triploid aberrants; the origin of these aberrants is discussed and their characteristics are described; most of them were less vigorous than the type; the F_2 and F_3 of the diploid and triploid aberrants showed them to be of sexual origin, but a clear tendency towards apomictic seed formation was observed in the progenies of many of the plants. It is seen therefore that apomictic strains may arise from sexual strains and sexual strains may arise from apomicts. Aberrant plants were found also in the progeny of plants growing in nature, the frequency varying in different families, high degrees of sexual seed formation being found in nearly all form complexes; none of the aberrants had arisen by the fertilizaton of an unreduced egg. The sexual types were inferior to the apomictic in both vitality and seed setting and are therefore assumed to have arisen as aberrants from apomictic strains.

Sharp differences were observed between the different apomictic forms found in nature, and their chromosome numbers varied from ± 50 to ± 124. Certain apomictic forms were practically male sterile and pseudogamous.

Apomictic strains of *P. pratensis* pollinated with *P. alpina* gave rise to maternal progeny but the sexual strains when so crossed always produced a number of hybrids, as did also the sexual aberrants. Nineteen hybrids were obtained, and of the 16 examined cytologically 12 had arisen from reduced egg cells and 4 from unreduced. The hybrids varied in chromosome number and in type but displayed characters from both parents. The pollen in both diploid and triploid hybrids tended to be larger than that of either parental species. The F_1 formed embryo sacs mostly with reduced chromosome numbers and formed seed sexually, although both parents were facultative apomicts. No sign of vivipary was observed. Backcrosses with *P. alpina* were more successful and gave more vigorous offspring than those with *P. pratensis*.

The phenomena of apomixis in *P. pratensis* are compared with those observed in other species. In *P. pratensis* it is clear that the egg nucleus in both the legitimate and the aposporous embryo sac can develop either by fertilization or by parthenogenesis, but pollen is necessary for seed formation in both cases. Apomixis appears to have arisen as a complicated product of segregation which has been favoured by natural selection. Any chromosome number between $2n = 49$ and 91 may exist; the plants with the higher chromosome numbers are shorter, have shorter panicles, broader leaves and a higher 1000 seed weight. A certain geographical localization of the strains with different chromosome numbers was observed, the higher numbers being found in maritime areas. The different form complexes differ in chromosome numbers, though intermediate types occur in nature as a result of hybridization, the F_1 hybrids being fully fertile.

1087. 633.21:576.356.52

KIELLANDER, C. L. 633.21:576.16

A subhaploid *Poa pratensis* L. with 18 chromosomes and its progeny.

Svensk Bot. Tidskr. 1942 : **36** : 200–20.

The family of *Poa pratensis* investigated has after free flowering proved completely constant morphologically throughout three generations, and this being true of all single plants and nearly all twins and triplets, the biotype in question, which had $2n = \pm 72$, may be regarded as apomictic. The progenies resemble the maternal plants. Among the twin plants several differ slightly from their co-twins and some of these aberrant individuals are more vigorous and are probably triploid.

Two aberrant forms, a twin with $2n = 40$ and a triplet with $2n = 18$ are described in detail and their possible mode of origin is discussed. A third haploid had $2n = 42$.

The progeny of the 18 chromosome plant after free flowering showed an average of 16 for the chromosome number (with 15 and 19 as the limits) and also, like their mother plant, resembled *P. trivialis* ($2n = 14$) in many morphological features. The possibility that *P. trivialis* may be one of the species that has contributed to the formation of *P. pratensis* is discussed.

1088. KIELLANDER, C. L. 633.21:581.163

Studies on apospory in *Poa pratensis* L.

Svensk Bot. Tidskr. 1941 : **35** : 321–32.

The author's findings, which are in part practically identical with those obtained by Tinney

(of. "Plant Breeding Abstracts", Vol. X, Abst. 1048) Åkerberg (cf. "Plant Breeding Abstracts", Vol. X, Abst. 152 and Abst. 1086 above), also comprise fuller particulars of the cytological conditions pertaining to seed formation in *P. pratensis* and apospory in general.
In the biotype of *P. pratensis* concerned the high frequency of polyembryony and twin formation (13% twins) is due to the occurrence of the aposporous embryo sac.

1089. Cugnac, A. de and Simonet, M. 633.262:576.312.35
Les nombres de chromosomes de quelques espèces du genre *Bromus* (Graminées). [**The chromosome numbers of certain species of *Bromus* (Gramineae)**].
C.R. Soc. Biol. Paris 1941 : **135** : No. 9/10 : 728–31.
The 2*n* chromosome numbers of species of *Bromus* determined by the authors are given as follows:—
1. *Serrajalcus-Michelaria* group, *B. sealinus* L. 28; *B. grossus* Desf. 28 var. *nitidus* (Dmrt.) A. de Cugn. et A. Camus, 28; *B. arduennensis* Dmrt. 28; F_2 hybrids of *grossus* x *arduennensis* and the reciprocal, 28; *B. arvensis* L., 14; *B.* (*pseudo arvensis*), 14; *B. squarrosus* L., 14; *B. macrostachys* Desf., 28; *B. adoensis* Hochst. 28.
2. *Eubromus* group, *B. rigidus* Roth, 42; *B. macrantherus*, Hack. 42; *B. Gussonei* Parl., 56; *B. madritensis* L., 28; *B. sterilis* L., 14; var. *velutinus* Volkart, 14; *B. tectorum* L., 14.
3. *Festucaria* group, *B. inermis* Leyss, 56.
The number for *B. Gussonei* confirms a suggestion on other grounds made earlier by one of the authors, that this species originates from the cross *B. sterilis* ♀ x *B. macrantherus* ♂.
The cross (*B. madritensis* x *sterilis*) x *sterilis* is suggested as the origin of *B. sterilis* var. *velutinus*. R. M. I.

1090. 633.284:576.312.35
Östergren, G. 633.284:575.127.2
Chromosome numbers in *Anthoxanthum*.
Hereditas, Lund 1942 : **28** : 242–43. (Abst.).
The numbers reported are $2n = 10$ in *A. aristatum* and *A. ovatum*, $2n = 10$ and $2n = 20$ in *A. odoratum*, and $2n = 80$ in *A. amarum*. The diploid and tetraploid strains of *A. odoratum* differ somewhat in morphology and in geographical distribution.
Hybrids have been obtained between *A. aristatum* and *A. odoratum*.

1091. Andrés, J. M. 633.289:576.312.35
Número de cromosomas en las especies del género *Hordeum* espontáneas en los alrededores de Buenos Aires. (**Chromosome numbers in the wild species of the genus *Hordeum* in the vicinity of Buenos Aires**).
Inst. Genét., Fac. Agron. Vet. Univ. B. Aires 1941 : **2** : 29–37.
This article has already been reviewed from another source (see "Plant Breeding Abstracts", Vol. XII, Abst. 804).

LEGUMINOUS FORAGE PLANTS 633.3

1092. Sinskaya, E. N. 633.31:575.127.2
(**Interspecific hybridization in alfalfa**).
Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : 85–91.
A table is given showing the results of different interspecific combinations in *Medicago*. Species with equal chromosome numbers cross with relative ease and give more fertile progeny than crosses between species differing in chromosome numbers. The new diploid species *M. quasifalcata* however is difficult to cross with other diploids and the hybrids produced are highly sterile. Spontaneous hybrids between species of different chromosome number are more fertile than those produced artificially. In Daghestan spontaneous hybrids have been found of *M. hemicycla* x *M. glutinosa* and showed a great range of combinations of the parental characters; most of them were highly fertile and proved to be tetraploid ($2n = 32$) instead of the expected triploid. The origin of these tetraploids may be due to the production of unreduced pollen grains by *M. hemicycla* and their selection by the *M. glutinosa* egg-cells. Natural hybrids between *M. quasifalcata* and *M. sativa* have been obtained by several investigators, and *M. difalcata* x *M. sativa* has also been reported.

Artificially, by the use of pollen mixtures it has been possible to produce fertile hybrids between *M. glutinosa* subsp. *polychroa* and *M. coerulea*. The most promising method of hybridization however is thought to be to sow a few plants of one species in a bed of the other species and allow selective fertilization to take place. From a practical point of view the drought resistance of *M. coerulea* is especially interesting and mixed sowings of this species with *M. sativa* are being made in the hope of producing tetraploid hybrids. *M. glutinosa* is also promising for crossing with *M. sativa* since its wild characters are not entirely dominant in the hybrids, many of which are of the cultivated type and display high fertility, though inheriting the disease resistance of *M. glutinosa*.

1093. LEVAN, A. .633.32:576.356.5:581.04
Plant breeding by induction of polyploidy and some results in clover.
Hereditas, Lund 1942 : **28** : 245–46. (Abst.).

Wild *Trifolium* species with up to 14-ploid and 20-ploid chromosome numbers are known in nature and have a good viability. Artificially produced tetraploids of red clover and alsike clover have given increases in fodder yield varying between 28 and 40%, and though the dry matter content was some 2% less the polyploids are thought to have distinct practical possibilities. Their reduced fertility may be a limiting factor.

1094. ATWOOD, S. S. 633.322:581.162.52:575.11
Genetics of self-compatibility in *Trifolium repens*.
J. Amer. Soc. Agron. 1942 : **34** : 353–64.

The original male parent used in this study showed its self-compatibility in its ability to set seed following different methods of self-pollination in the greenhouse, bagging in the field with and without manipulation of the flower heads and bee pollination under a cage in the field. The female parent, shown to have the constitution S_3S_4 had only a low degree of self-compatibility. The results of crosses between F_1 plants, back-crosses, crosses with homozygous tester plants and crosses with F_2 plants showed that self-compatibility was determined by a gene S_f belonging to the allelomorphic series concerned with compatibility and that the original male parent had the constitution S_8S_f.

The factor S_f confers on pollen carrying it the ability to grow and function on any pistil, whether carrying S_f or not, and moreover S_x pollen will grow and function on a pistil having the constitution S_xS_f. Pollen carrying S_f does not stimulate S_x pollen applied with it on pistils carrying S_x. The degree of expression of S_f is variable in different plants and is probably affected by modifying factors. The most critical method of detecting self-compatibility is to cross the plants concerned with parents and sibs, when self-incompatible plants show a marked group reaction and self-compatible plants do not. Other methods, in diminishing order of reliability, are selfing a number of flowers in the greenhouse, bagging and manipulating entire heads and, least reliable of all, bagging heads without manipulation. The wide variations in set obtained by bagging without manipulation suggest that self-compatibility and autogamy are distinct characters. Some inbred plants were effectively male sterile because of hard anthers.

A method of using the S_f allelomorph in a breeding programme is suggested. J. L. F.

1095. 633.35:576.312.34
COUTINHO, L. A. 633.63:575.127.2
Raças cariológicas na *V. sativa* L. (**Karyological races in *V. sativa* L.**).
Agron. Lusitana 1940 : **2** : 379–403.

The somatic number 12 was observed in *Vicia amphicarpa* as well as *V. sativa* and *V. macrocarpa*. The idiograms of all 3 species are illustrated and described; that of *V. amphicarpa* resembled *V. sativa* somewhat more closely than did that of *V. macrocarpa*. The chromosomes are of 2 types, the one group being relatively stable in all 3 species and the other more subject to modification, especially as regards the length of arm. One line of *V. sativa* contained certain partially sterile plants with more than usual instability of the chromosomes. Some plants of this line also had aberrant chromosome numbers, e.g. $2n = 10$ and $2n = 11$, and it was ultimately classed as a hybrid of *V. sativa* with *V. macrocarpa*.

1096. ZAHNLEY, J. W. 633.366:575(78.1)
Madrid sweet clover, a new crop.
32nd Bienn. Rep. Kansas Bd Agric. 1940 : **37** : 224–27.

This variety of *Melilotus* has been designated Madrid Yellow No. 27,474. While total yields

are not as high as those of the common white blossom species, the forage is not so rank and stemmy. Merits of the variety are discussed in regard to maturity and seed production, leafiness and frost resistance and seedling vigour.

1097. HARTWIG, E. E. 633.366:575.14
Effects of self-pollination in sweet clover.
J. Amer. Soc. Agron. 1942 : **34** : 376–87.

The effect of inbreeding by self-pollination was studied in *Melilotus alba*, *M. officinalis*, *M. taurica* and *M. suaveolens*; *M. alba* was studied the most extensively.
In *M. alba* the first inbred generation (S_1) was about 16% less in mean height, and the S_2 about 26% less, than controls from open-pollinated seed (O.P.). In *M. officinalis* the S_1 families averaged 72·6% of the height of the O.P. families. Single families of *M. taurica* and *M. suaveolens* were 96·0% and 92·4% of the height of their respective O.P. controls.
Selfing *M. officinalis* led to a slight decline in stem number of spaced plants but not in *M. alba*.
S_1 plants in *M. officinalis* and *M. alba* were on the average later in flowering than O.P. plants, but this is probably because the parents were selected for lateness; the O.P. plants therefore would be the result of crossing with earlier plants. S_2 plants were not consistently earlier or later than S_1.
A marked reduction in fertility occurred in both the first and second generations of inbreeding. There was also a slight tendency for inbred families to be more susceptible to diseases.
In the S_2 generation considerable uniformity with respect to time of first bloom and disease reaction was found in certain families.
A procedure for utilizing inbreeding in the development of a synthetic variety is outlined.

J. L. F.

1098. SWENSON, S. P. 633.366:581.48:575.11.061.6
Inheritance of seed color in biennial white sweet clover, *Melilotus alba*.
J. Amer. Soc. Agron. 1942 : **34** : 452–59.

The work of Fowlds ("Plant Breeding Abstracts", Vol. X, Abst. 157) is supplemented, results obtained from F_2 plants of the cross green x pale yellow being recorded. The occurrence of yellow, pale yellow, green and pale green seeds in sweet clover may be explained on the basis of two independent gene pairs *Cc* and *Yy*. The presence of *C* is necessary for colour production in the seed coat. *Y* produces yellow colour in the cotyledons and also in the seed coat in the presence of *C*, while *y* produces green colour in the cotyledons and also in the seed coat if *C* is present.
The green-seeded parent has a dwarf growth habit in contrast to the normal habit of the pale-yellow parent. Data on the inheritance of growth habit are recorded and indicate that the gene for growth habit is independent of the two genes determining seed colour.
There is inconclusive evidence that dwarf and intermediate plants are more susceptible to root rot infestation than are normal tall plants.

1099. MALHEIROS, N. 633.367:576.312.35
Elementos para o estudo citológico do género *"Lupinus"*. (**Cytological study of the genus *"Lupinus"*).**
Rev. Agron., Lisboa 1941 : **29** : 105–06.

The author's counts give 40 (somatic?) chromosomes for *L. angustifolius*, 50 for *L. albus*, 52 for *L. luteus* and *L. Rothmaleri* Klink and 32 for *L. Cosentini* Güss.
Observations were also made on the chromosome morphology.

1100. *WUTTKE, H. 633.367:581.6:578.08
Einfache Alkaloiduntersuchungsmethoden von gelben und blauen Lupinen. (**Simple methods of alkaloid estimation in yellow and blue lupins**).
Züchter 1942 : **14** : 83–86.

Methods of rapidly determining the alkaloid content are described. The first consists of immersing a disc cut from the seed in IKI solution, the second of boiling the seeds for 1½ hours and then immersing the seeds in IKI. In each case the bitter seeds give a reddish brown coloration whilst the sweet seeds remain yellow.
Large plantations are tested for contamination with bitter forms by immersing leaves picked from each plant.

* An extended summary of this paper is on file at the Bureau.

1101. Č, N. 633.367–2.951.1
(New properties of lupin).
Sotsialističeskoe Sel'skoe Khozjaistvo (Socialistic Agriculture) Moscow 1941: No. 5 : p. 95.
The alkaloid contained in the seeds of blue and white lupins was found to possess pronounced insecticidal properties, in which respect it exceeded anabasine. The protein extracted from the seeds has been successfully used for preparing artificial silk. The residue is used as stock feed.

ROOTS AND TUBERS 633.4

1102. Stevenson, F. J. 633.491:575(73)
Potato varieties recently introduced to growers.
Amer. Potato J. 1942 : 19 : 41–42.
The varieties of potatoes that have been distributed to growers within the past ten years as a result of the work of the National Potato Breeding Programme carried on co-operatively between the U.S. Department of Agriculture and about 30 State experiment stations include Katahdin, Chippewa, Sebago, Houma, Earlaine No. 2, Mesaba, Pontiac, Sequoia, Warba, Red Warba, Certified Nittany Cobbler and Pennigan. All these varieties are now fairly widely grown. H. W. H.

1103. Lombard, P. M. et al. 633.491:575:581.44
Report of potato variety nomenclature committee.
Amer. Potato J. 1942 : 19 : 68–71.
The origin of the variety Harmony Bell has been traced—it was produced in about 1880 from a seed ball of unknown parentage. Definitions are given of the following five types of stoloniferousness—basal set, tuberous, slightly stoloniferous, stoloniferous and completely stoloniferous (cf. "Plant Breeding Abstracts", Vol. X, Abst. 1055). An exhaustive study has been made by Dr. William Stuart regarding the identity of the White Rose and American Giant varieties. Sample lots of the two varieties have been found to be identical but a search of seed catalogues and farm journals did not clearly establish that the two so-called varieties were originally identical. White Rose appears to be mentioned in the literature 10 years earlier than the American Giant. H. W. H.

1104. Berljand, S. S. 633.491:575.3:581.165.71
(The inheritance by the potato of aerial tuber formation as a result of grafting).
Jarovizacija 1941 : No. 2 (35) : 107–09.
Grafts of domestic potato varieties on tomato produced aerial tubers. The same phenomenon was observed in grafts of potato on egg plant, *Datura*, *Physalis*, tobacco and nightshade. The aerial tubers differed from subterranean tubers in having no dormancy period. The plants arising from them were mostly normal for the domestic variety in question but 2 of them began after 35–40 days to produce small aerial tubers themselves.

1105. Zuckerman, H. G. 633.491:575.42:575.247
Selection of parent seed potatoes.
Amer. Potato J. 1942 : 19 : 61–67.
It is suggested that the hereditary status of the potato is greatly influenced by the intermixture of descendants from mutant eyes. Even when parent stocks are free from bacteria, fungus and virus diseases, the grower can often improve the variety by selection. A method of selecting valuable clones is given—the first step is to set up a number of lines, each line being originated from a single eye. Useless lines are then eliminated and after further selection new lines are again obtained from single eyes. H. W. H.

1106. 633.491:576.312.35(8)
Ratera, E. L. 633.491:576.356.5
Cariología de algunas variedades cultivadas de papas Sudamericanas.
(Karyology of certain cultivated S. American potatoes).
Rev. Fac. Agron. B. Aires 1942 : 9 : 254–61.
Pollen mother cell counts were made in a number of varieties of *S. andigenum* and of *S. tuberosum* in all of which the number $n = 24$ was observed, except two Chilean varieties of *S. tuberosum*, Coraila estrella with $n = 48$ and Mantequilla with $n = 12$.

1107. Werner, H. O. 633.491:581.143.26.03
Relative response of several varieties of potatoes to progressively changing temperatures and photoperiods controlled to simulate "northern" and "southern" conditions.
Amer. Potato J. 1942 : **19** : 30–40.

The varieties used in the experiments were Warba, Triumph 12 and 23, Irish Cobbler, Chippewa, Katahdin and Russet Rural. Tables are given of fresh weight of vegetative parts, mean number of tubers produced per plant, mean weight per plant (in grams) of tubers produced by each variety under northern and southern conditions, and also of ratios of fresh weight of tubers to fresh weight of tops produced by each variety in various numbers of days after emergence under the two conditions.
The northern type of environment permits the manifestation of more varietal differences than does the southern type. (See also "Plant Breeding Abstracts", Vol. XI, Abst. 154).

1108. Werner, H. O. 633.491:581.143.36.035.1
Relation of length of photoperiod and intensity of supplemental light to the production of flowers and berries in the greenhouse by several varieties of potatoes.
J. Agric. Res. 1942 : **64** : 257–74.

The effect of different photoperiods (about 10 hours, and 24 hours), of the intensity and period of the supplemental light and of the temperature on flowering and berry production in the greenhouse in winter was studied, using the varieties Earlaine, Triumph 12, B4–1 (also known as Minnesota 29.32–1–34) and Katahdin. The most extensive blossom, berry and seed production took place when a light intensity of about 500 foot-candles at the tops of the plants was used for supplemental light during a 24-hour photoperiod. This treatment was effective with varieties that do not bloom or set fruits readily. The amount of flowering and berry production decreased as the photoperiod or light intensity decreased for all varieties. The effect of intermittent long photoperiods and of the sprouting of parent seed tubers in continuous light were also investigated. Good tuber development took place in all treatments. Vegetative growth was most rapid for plants receiving weak supplemental light for 24 hours and slowest for plants growing in an 18-hour photoperiod with the brightest supplemental light. H. W. H.

1109. Clarke, A. E. and
Lombard, P. M. 633.491:581.162:581.143.26.035.1
Flower bud formation in the potato plant as influenced by variety, size of seed piece, and light.
Amer. Potato J. 1942 : **19** : 97–105.

Twenty-seven varieties grown under the same environmental conditions were found to differ in the numbers of buds produced in the first inflorescence. Fewer buds were initiated in plants from 5 grm. seed pieces than from 25 and 45 grm. pieces, but there was little difference between the larger pieces. Total darkness decreased the numbers of buds differentiated. Mazda light of low intensity (20–30 foot-candles) had little effect while fluorescent light of high intensity (500–600 foot-candles) increased bud production in winter when dull, cloudy weather preceded the counts. Lengthening the photoperiod assisted mature flower formation by reducing bud abscission. C. M. D.

1110. Sengbusch, R. v. 633.491:581.6:578.08
Neue Stärkewaagen zur Schnellbestimmung des Stärkegehalts von Kartoffeln für züchterische Zwecke. (**New starch balances for the rapid estimation of the starch content of potatoes for breeding purposes**).
Forschungsdienst 1942 : **13** : 19–24.

The under-water and over-water weight of the potatoes is measured on 2 separate balances and from these figures the starch content is determined from a table. A further refinement is an under-water balance graduated with a series of over-water weights of a certain range, from which the starch contents can be read off directly. A simple model designed for use in breeding operations is described, which registers starch contents from 9 to 26% for tuber weights ranging from 500 to 600 grm. and from 1000 to 1200 grm.

1111. MÜLLER, K. O. and BÖRGER, H. 633.491–2.411.4–1.521.6
Experimentelle Untersuchungen über die Phytophthora-Resistenz der Kartoffel—zugleich ein Beitrag zum Problem der "erworbenen Resistenz" im Pflanzenreich. (**Experimental investigations on the Phytophthora resistance of the potato, and a contribution to the problem of "acquired immunity" in the plant kingdom**).
Arb. biol. Reichsanst. Land- u. Forstw., Berl. 1941 : **23** : 189–231.

A number of cultivated varieties and of the so-called W varieties were tested with two strains of *Phytophthora infestans* and the reactions are described in detail. When the W varieties were inoculated with strain A_m, to which they are resistant, and 24 hours later with strain S_3, to which they are normally susceptible, no infection took place, though occasional hyphae penetrated and would sometimes produce a mycelium when the inoculated end of the tuber was removed. No reduction in infection was observed when cut tubers were left for 24 hours without inoculation with strain A and then inoculated with strain S; the S immunity acquired after infection with A was confined to the necrotic areas produced by the A infection, or to the tissues immediately adjacent to them; the actual extent of the immunized area was proportional to the degree of resistance of the variety. Simultaneous application of strains A and S caused a certain inhibition of the S strain, but to a less pronounced degree than when S was applied 24 hours later; the immunizing effect of the A strain was found to be proportional to its relative concentration, though no concentration of A was sufficient to prevent infection with S if both were applied together. Cultures taken from sporangia developing from a mixed infection with races A and S on a W variety consisted exclusively of strain S, those from a similar infection of a susceptible variety (Frühgold) consisted of equal proportions of both strains. Though the parasite was inhibited by pre-treatment with strain A, it remained viable for at least 9–10 days and could produce necrosis when a small piece of the infected tuber was grafted on to a tuber of a susceptible variety. A preliminary inoculation with strain A of *P. infestans* made the tubers also resistant to attack by *Fusarium coeruleum*, showing that the effect is not "strictly specific". The growth even of various saprophytic organisms such as *Fusarium solani* and *Penicillium glaucum* was also inhibited.
The results are discussed and compared with those of other workers in a critical review of the literature on acquired immunity in plants. The difference between the resistant and susceptible varieties is that the former react more rapidly and their cells die sooner under the influence of the parasite; the S strain of the parasite is actually less virulent than the A strain, so that the W cells react less violently and a certain degree of symbiosis is established, leading to infection. Infection with strain A leads to the liberation of a toxic substance which then confers immunity to strain S. This substance, or group of substances, is thought to be allied to the tannins.

FIBRES 633.5

1112. DEWEY, L. H. 633.5
Fibras vegetales. (**Plant fibres**).
Publ. Agric. Un. Panamer. Wash. 1941 : Nos. 137–40 : Pp. 101.

The author discusses the different types of fibre, the names by which the different fibre plants are known and gives descriptions of over 40 different species of fibre producing plants, classified as hard fibres (including various species of *Agave, Yucca, Phormium* and others), palm fibres, soft fibres (including hemp, jute and ramie) and short fibres (kapok and others). *Muhlenbergia macroura* and *Tillandsia usneoides* are also included. The descriptions include an account of the habit of the plant, the fibres, flowering habits, methods of propagation, diseases and cultural requirements.

1113. 633.51:575.11.061.1
NEELY, J. W. 633.51:575.116.1.061.6
Inheritance of cluster habit and its linkage relation with anthocyanin pigmentation in Upland cotton.
J. Agric. Res. 1942 : **64** : 105–17.

Using the varieties Winesap (red plant colour, non-cluster habit) and Bawaka (green, cluster), it was confirmed that these contrasting characters were each controlled by a single pair of

allelomorphs R_1^{re}-red, r_1^{re}-green and *Cl*-non-cluster. From the F_2 and F_3 segregations and from a back-cross family it was confirmed that these factors are linked, the recombination being about 18·5%. J. L. F.

1114. 633.51:575.11.061.6
McMichael, S. C. 633.51:575.11–181
Occurrence of the dwarf-red character in Upland cotton.
J. Agric. Res. 1942 : **64** : 477–81.

A plant which was discovered in Acala cotton was a sectorial chimaera for red and green plant colour. Seed taken from red branches segregated into three types, dwarf red plant, plants intermediate in height and colour and plants normal in height and green in colour. In crosses between homozygous dwarf reds and normal greens F_2 ratios of 1 dwarf red : 2 intermediate : 1 normal green and back-cross ratios of 1 intermediate : 1 normal green were obtained. The dwarf red condition is therefore apparently controlled by a single gene. This new red type of Upland cotton differs from other types not only in its association with dwarfness but in the cream instead of red flowers and the green instead of red bolls. J. L. F.

1115. Tsinda, K. I. 633.51:575.148:575.12
(Intra-varietal crossing in cotton).
Jarovizacija 1941 : No. 2 (35) : 51–55.

The first generation from intra-varietal crosses in 4 varieties of *Gossypium barbadense* made in 1937 showed a greater energy of germination, and gave increases in yield of raw cotton varying between 1·45 and 5·44 c. per ha.; their yield was also of a higher quality, a greater proportion of it being picked before the frosts. Maarad gave the greatest yield increase, the variety 12761 the least, Pima and 2 Iz being intermediate. In the following generation differences in yield were still evident, and varied from 3·08 to 3·44 c. per ha. No difference was observed in size of boll, lint length or ginning percentage.

The experiment was repeated in 1938 with Maarad, 2 Iz and 3 varieties of *G. hirsutum* L., 36 Me, 8517 and 1306. Local Turkmen material served in each case as maternal parent and was pollinated from material reproduced elsewhere. This gave much greater yield increases than crosses between the local material. The variety Maarad was especially improved as regards earliness by crossing.

Different results were often obtained with material from different localities. The greatest differences were invariably observed when the progenies were grown under the most favourable conditions.

1116. Krasovskii, I. R. 633.51:575.7:575.14
(Degeneration of industrial varieties of cotton).
Jarovizacija 1941 : No. 2 (35) : 47–50.

Descriptions are given of various off-types found in élite material of a number of cotton varieties. Many of them were sterile or of reduced fertility. The élites were grown under conditions designed to preclude out-pollination and the degeneration is ascribed to the fact that the élites are produced from the progenies of two or three single plants, which has reduced their range of adaptability. A much larger number of plants is now taken as the basis for élite production so as to avoid this danger, and the application of intravarietal crosses is recommended.

1117. Smith, E. G. 633.51:581.47:575.11.061.5
Inheritance of smooth and pitted bolls in Pima cotton.
J. Agric. Res. 1942 : **64** : 101–03.

In Pima cotton (*Gossypium barbadense*) the bolls have conspicuous pits (oil glands) but a variant discovered in 1932 has much less conspicuous pits and its bolls appear smooth. Progeny raised from this plant all had smooth bolls and formed the basis of a line called "P Hope". When the smooth-bolled type was crossed with normal Pima the F_1 had intermediate bolls; in F_2 segregation into 1 pitted : 2 intermediate : 1 smooth was observed; in back-crosses of the F_1 to smooth or pitted types 1 : 1 segregation was observed. It is concluded that a single pair of allelomorphs is involved, B^p-pitted and B^s-smooth. It is not known whether the original smooth type was a mutant or was derived by repeated natural back-crossing to Pima, from a natural hybrid between Pima and an Upland cotton (*G. hirsutum*). J. L. F.

1118. Ol'šanskii, M. A. 633.51:581.6:575.42(47)
(Variations in the length of cotton fibre in the direction of selection).
Jarovizacija 1941 : No. 2 (35) : 101–03.
In 1934 lint length was measured in 42 F_4 plants from the cross Pioneer 915 × Schroeder 1306; the lint length varied in the different plants from 20·0 to 26·0 mm. The 42 F_5 families were sown separately and their mean lint length was 24·4 mm. The 4 best families with an average length of 24·8 mm. were selected. Further selection was repeated each year and raised the mean lint length to 31 mm., with variations from 28 to 35 mm. by 1940.

1119. Stroman, G. N. 633.51:581.6
Diameter of fibre in different strains of Acala cotton.
J. Agric. Res. 1942 : **64** : 243–55.
The object of this study was to determine whether certain strains could be differentiated on the basis of diameter of fibre. It was found that different lengths of fibre from a given sample have different fibre diameters.
The swollen diameter of $1\frac{1}{8}$ inch lengths of fibre was chosen to compare 12 strains, and significant differences were found. Significant differences also existed between strains in respect of ribbon width and thickness. There were significant correlations between ribbon width and thickness, number of convolutions and ribbon width, and between ribbon thickness and number of convolutions for some of the strains. O. K.

1120. Tisdale, H. B. and
Dick, J. B. 633.51–2.484:576.16:631.521.6
Cotton wilt in Alabama as affected by potash supplements and as related to varietal behaviour and other important agronomic problems.
J. Amer. Soc. Agron. 1942 : **34** : 405–26.
There is evidence against the conception of the existence of physiological races of the pathogen (*Fusarium vasinfectum* Atk.) differing in their ability to parasitize specific varieties of *Gossypium*. The differential response of varieties to potash, the influence of seasons and other environmental factors are indicated as of greater practical concern than are possible races of the pathogen that would complicate the breeders' programme.

1121. Franssen, C. J. H.,
Levert, Ph. and
Duyvendijk, J. A. van 633.513–2.7–1.521.6(92)
Over biologie en bestrijding van den randoekolfboorder (*Mudaria variabilis* RPKE). [**On the biology and control of the kapok pod borer (*M. variabilis* RPKE)**].
Bergcultures 1941 : **15** : 1728–43.
So far all the varieties of kapok (*Ceiba pentandra*) grown in Java have proved susceptible to attack by *M. variabilis* and no specifically resistant types are yet known. At the Moektihardjo (Pati) Experimental and Seed Station for kapok some lanang types (i.e. which do not shed their lowest branches) apparently showed the least infestation. This is attributed to the preference of the moth for laying its eggs as high up as possible, the relatively low growing lanang type being therefore ignored in favour of taller varieties. If this be so, no advantage would be gained by planting the lanang type only. The question, however, needs further investigation.

1122. Levan, A. 633.52:576.356.5:581.04
The response of some flax strains to tetraploidy.
Hereditas, Lund 1942 : **28** : 246–48.
A number of artificial tetraploids of both fibre and oil flax have been studied. They are all lower in fertility and vitality, have larger cells and mottled seeds. The tetraploid oil types surpassed the diploids in growth towards the end of the season.
Hybrids between the tetraploids were more fertile than the pure tetraploids; thus 95 F_1 plants in the greenhouse yielded 17·3 seeds per plant as against 8·9 seeds from the tetraploids themselves. The difference however was due to greater size rather than greater number of seeds.

1123. 633.52–2.482–1.521.6
KRÜGER, E. 633.52–2.483–1.521.6
Untersuchungen über zwei der bedeutendsten Leinparasiten—*Colletotrichum lini* Manns et Bolley und *Septoria linicola* (Speg.) Gar. (*Sphaerella linorum* Wr.). [**Investigations on two of the most important flax parasites, *C. lini* Manns et Bolley and *Septoria linicola* (Speg.) Gar. (*Sphaerella linorum* Wr.)**].
Arb. biol. Reichsanst. Land- u. Forstw., Berl. 1941 : **23** : 163–88.

The parasites and their symptoms are fully described. Tests of half-a-dozen lots of different origin on different fibre flax varieties gave no indication of the existence of physiological specialization. The vast majority of the 93 varieties tested were susceptible to both fungi; only two were classed as resistant both to *Septoria* and to *Colletotrichum*, namely, Tirol 3 and a form of unknown origin.

1124. 633.522:576.356.5:581.04
RYBIN, W. A. 633.522:575"793"
(**Chromosome doubling in hemp**).
Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : 99–110.

The value of the colchicine method of inducing polyploidy and the virtues and defects of polyploids are discussed. Experiments were started in 1938 with Central Russian and Italian hemp varieties; plants which were 20–30 cm. high had their leaves cut and were immersed in a 0·05–0·1% colchicine solution for 20 to 27 hours at a temperature of 25–30° C. Several plants produced a number of branches showing the typical effects of colchicine—deeper green pigmentation, larger cells, thicker leaves and larger flowers: the pollen grains in the male plants and the seeds from the female plants were larger and these seeds gave rise to tetraploid seedlings. The tetraploids were very difficult to cross with the diploid plants though they gave seed from tetraploid pollen; even when tetraploid plants did set seed after pollination exclusively with pollen from diploid plants the resulting progeny contained very few triploids and consisted mainly of tetraploids. These moreover were almost all females; two monoecious plants occurred among them and gave progeny consisting largely of males, with a very few females and monoecious. The second generation from the tetraploids contained quite a number of monoecious plants, which varied greatly in habit and general type; they mostly bore male and female flowers mixed indiscriminately in all the inflorescences but were much less fertile than the female plants.
By pollinating a tetraploid Russian female with a tetraploid Italian male 12 seedlings were obtained, all of which had the tetraploid number $2n = 40$. Only one plant was male, the rest were all females. They were intermediate between the two parental types in most respects and bore very large flowers and seeds. Their reduction division was very regular; the male plant was later in maturity than the corresponding diploids, which from an agricultural point of view is an advantage, since it brings the flowering of the males and females almost together.

1125. 633.526.23:581.162
MEDINA, J. C. 633.526.23:575.114
Nota preliminar sobre a reprodução sexual do sisal. (**Preliminary note on sexual reproduction in sisal**).
Rev. Agric. Piracicaba 1942 : **17** : 41–50.

By cutting off the top of the inflorescence and allowing the dormant buds at the base to develop, in the manner described by Nutman (see "Plant Breeding Abstracts", Vol. II, Abst. 179) 50 fruits were obtained from a plant of *Agave sisalana*. The average number of fertile seeds in 16 fruits collected before dehiscence amounted to 4·94%; the seeds were easily germinated on moist filter paper after scarification; quite good germination was also obtained in moist earth; 125 seedlings were produced, 90 of which survived. All the seedlings have spines on the leaf margins, although the parent had smooth leaves. Great variation was observed among the seedlings in other respects; their development however was extremely slow.

1126. Floderus, B. 633.584.3:582
***Salix rotundifolia* Trautv. and *Salix nummularia* Anderss.**
Svensk Bot. Tidskr. 1941 : **35** : 351–52.
A discussion on the taxonomic problem presented by the two species. In spite of current opinion, the author concludes from his recent researches that they are distinct species.

1127. 633.584.3:582(78.8)
Smith, E. C. 633.584.3:575.127.2
The willows of Colorado.
Amer. Midl. Nat. 1942 : **27** : 217–52.
Data are given regarding the species and their distribution, flowering habits and hybrids. Full descriptions are given of the species and a diagnostic key is provided. Forms intermediate between *Salix pseudolapponum* and *S. brachycarpa* and between *S. Greyeriana* and *S. petiolaris* are most common and many of them are presumed to be hybrids. Bisexual forms have been found in 9 species.

SUGAR PLANTS 633.6

1128. Cross, W. E. 633.61:575:578.08
La rapida multiplicación de caña de las nuevas variedades. (**Rapid multiplication of cane of new varieties**).
Circ. Estac. Exp. Agric. Tucumán 1942 : No. 106 : Pp. 2.
The experimental material is planted in holes instead of rows, a quantity of fine earth being placed in each hole and abundant manurial dressings applied. From each 100 kg. of cane planted, an average of 4,050 kg. of cane is produced.

1129 Groot, G. J. de (jun.) 633.61:578.088:581.45
Identificatie van rietvariëteiten en de methode Jeswiet. (**Identification of varieties of cane and Jeswiet's method**).
Arch. Suikerind. Nederland Ned.-Ind. 1941 : **2** : 438–44.
The views of Fawcett, Mameli de Calvino, Smith, Artschwager and others on Jeswiet's method of identifying canes are discussed as well as the extent to which it is used now at the Pasoeroean Experiment Station. There, though a comprehensive analysis of the hair groups on the buds and leaves is still carried out, it is no longer included in the systematic description of the canes and the inclusion of such features is only recommended when they show remarkable development or when identification cannot be completed by other means.
The author endorses Artschwager's conclusion that the bud scales may be either glabrous or hairy with the hairs arranged in more or less discrete groups or in transitional groups; their presence and constancy are regarded as valuable taxonomic characteristics.

1130. 633.61:581.162:575(92.2)
Zijn bloeigevallen te verwachten ook in nieuwe rietsoorten, welke tot dusver geen bloeiverschijnselen hebben vertoond? (**Are instances of flowering to be expected even in new cane varieties which so far have shown no signs of flowering?**)
Arch Suikerind. Nederland Ned.-Ind. 1941 : **2** : p. 422.
Varietal differences between HVA 124 and HVA 125 in the percentage of flowering (10 and 30% respectively) are recorded.

1131. Booberg, G. 633.61:581.162:581.143.26.035.1(92.2)
Factoren, welke den rietbloei beïnvloeden. (**Factors which affect flowering of cane**).
Arch. Suikerind. Nederland Ned.-Ind. 1941 : **2** : 418–21.
Length of day is considered as one of the factors concerned, and with special reference to regional differences in the flowering of cane varieties in Java.

1132. Cross, W. E. 633.61–2.451.2–1.521.6(82)
Variedades de caña convenientes para plantar. (**Cane varieties suitable for planting**).
Bol. Estac. Agric. Tucumán 1942 : No. 35 : Pp. 17.
Attacks of *Ustilago scitaminea* Syd. have recently become frequent in Tucumán and the

common varieties P.O.J. 36 and its mutants have proved to be the most susceptible. Several other canes, however, P.O.J., Co. and Tucumán seedlings, have proved resistant and reports on their behaviour are presented, with details regarding their yield, sugar content and resistance to frost and many diseases including smut. Some of the more promising new Tucumán seedlings are included in the reports.

1133. KIRYU, T. 633.61–2.483–1.521.6:578.08(52)
(On a method of varietal resistance trials of sugar cane to red rot).
Ann Phyto. Soc., Japan 1940 : **10** : 156–70.

A detailed account is given of the methods of inoculation and field observation and of estimating damage or resistance, used at the Government Sugar Experiment Station, Tainan, Formosa, in selecting red rot (*Colletotrichum falcatum*) resistant varieties of cane.

Two to three months before harvest, 30–40 stalks of each variety being tested are inoculated with portions of 4-day-old cultures on cane juice agar kept at 28° C. The inoculation is made through apertures 7 mm. in diameter punched in the centre of the internode.

1134. 633.63:575(47)
***(Beet Growing. Vol. 1. Biology, genetics and breeding of sugar beet).**
Vsesojuznyí N-I Institut Sakharnoi Promyšlennosti (Sci. Inst. Sug. Ind.)
Kiev, 1940 : Pp. 918.

The study concerns phenotypic variation in its relation to genetically variable characters, with special reference to sugar content and root yield in certain selections described. The full range of variation in the genus *Beta* is only now being utilized. Hitherto the attention of breeders has been confined to the sugar beet type, but attention is now given to the potentialities of the leaf, wild and other forms.

Data recorded from an examination of 150 varieties of sugar, forage and table beet and chard include (1) genotypical variation of characters expressed as variation coefficients; and (2) correlation of characters within a sugar beet clone expressed as correlation coefficients. There is no correlation between varieties of physiologically associated characters, and the correlation between root weight and sugar content is particularly variable in the different varieties. On the other hand correlation between weight of tops and of roots is almost the same in many varieties, and is more strongly expressed in the early than in the late developmental phases.

Results so far obtained from studies on inheritance of characters in beets are reviewed and the importance of correct pollination control for successful breeding is stressed. The tests have included that of sugar content inheritance in crosses between different beet types. The hybrids are intermediate in sugar content, although the actual figures and proportions between parents and hybrids vary with environmental conditions and from year to year. Hybrids between different varieties of forage beet, on the other hand, often exceed the parents in sugar content as do hybrids between table and forage beet, and hybrids between different varieties of sugar beet. The data regarding the crosses also include yields, response to manurial treatment, distribution of sugar in the tissues, enzyme activity, the sugar content of F_2 and later generations, and biochemical investigations. There is indication that not only improved sugar beets, but also new types of fodder and table beets may be created, and that crosses made between root and leaf beets have shown the way to synthesize the sugar beet.

The genetical results are discussed in their bearing on the phylogeny of the genus. The technique for various selections, together with the significance of the results, are dealt with in detail, data being recorded in many tables.

Following a discussion of the origin of the breeding material, and the effects on it of selection work, a chapter is devoted to selection methods, the principles of mass and group selection being expounded and the importance of pollination control being again noted. The qualities of varieties produced at certain Soviet breeding stations are recorded, with details of selection methods and plot design.

Reproduction without selection tends to reduce quality and yield, and therefore sugar beet varieties have to be constantly renewed. In the Soviet Union from 1901 to 1914 the average sugar content of the varieties tested was 17·60%, while from 1922 to 1935 it was 18·58%. These sugar contents apply to the varieties E or N type, the only types grown extensively in U.S.S.R.

* An abridged translation of this monograph is on file at the Bureau.

There is also information on the effect of selection against noxious nitrogen; the results of 10 years' selection for high and low sugar content carried out on uniform material and starting with the same root weight; the need for employing a group standard instead of only a single standard variety for comparisons; methods of isolation for experiments in inbreeding, and the unsatisfactory results obtained in the Soviet Union and elsewhere by inbreeding. It is noted that no reduction of sugar content was observed as a result of inbreeding, the slight fall noticed in the fourth and fifth generations of inbred lines being due to selection for yield introduced at that stage. Certain lines, recorded as promising for breeding purposes, combine resistance with high sugar content, but for successful intercrossing of inbred lines it is essential that a correct choice of parental combinations be made and that a maximum amount of cross fertilization is secured.

A method for crossing between populations is described, together with that of line crossing, crossing for seed production, the back-cross method, and selection for special characters (increase in size of seed and reduction in their number is desirable). Further, differences in response of varieties to manures are considered. The relative value of varieties may be completely reversed by a difference in manuring and it is therefore essential to carry out selection work under the particular conditions that the crop will receive when it is grown commercially. Other items discussed include methods of studying earliness, drought and cold resistance, phasic development, selection against bolting and resistance to fungous diseases. The final sections of the work include an account of breeding technique. It is claimed that the cloning method described provides an admirable method of preserving promising types (without the risk of cross-pollination) and of producing pollinators for seed production purposes. The advantages of cultivating seed plants in the greenhouse are discussed; sugar beet varieties are defined and their origins described, with special reference to changes induced in breeding material by experiments made at the various Soviet stations. Consideration is also given to reaction of the crop to climatic and other conditions; to the principles of testing and distributing the varieties, and to seed production. The publication concludes with details of the work carried out at the following stations:—Uladovka-Ljulintsy, Ramon', L'gov, and Kuban' Station.

1135. *Zossimovich, V. P. 633.63:575.127.2

[Interspecific hybridization in beet (I. *Beta vulgaris* L. x *Beta lomatogona* E. et M. II. *Beta vulgaris* L. x *B. macrorhiza* Stev.)].

Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : 46–65.

Hybrids between *B. lomatogona* and the sugar beet Uladovka E were obtained by Michurin's method of vegetative rapprochement. The F_1 plants were intermediate or resembled *B. lomatogona*. They were more vigorous than the parents both in root and top development but inherited the low sugar content of the wild beet and also its forked and deep root. The roots contained less mechanical tissue than *B. lomatogona* and the plants were less hardy. *B. lomatogona* was also crossed with two varieties of table beet, Trevise and Bassano. The general characters shown by these hybrids were as above, except that there was little or no forking of the roots. The colour of the table beet was dominant.

In each combination a single plant bolted in the first year; the inflorescence was of the *B. lomatogona* type, the glomerules 2–3 seeded and the characters of the flowers generally similar to *B. vulgaris*.

All the above F_1 hybrids were sterile. The pollen was defective and the anthers failed to dehisce. The female gametophyte was normal. At diakinesis there were $2\ 5_{II} + 8\ 14_{I}$, total chromosome number being 18, as in both parents. Meiosis was very irregular; 2–6 microspores, with a chromosome number of 3–17, were formed.

Hybrids between *B. macrorhiza* Stev. and the fodder beet White Giant were also obtained, the latter being used as the female parent. The hybrid had large, elliptical colourless cotyledons, and the early leaves had short petioles like *B. macrorhiza*. The seedlings grew more slowly than the parents in the early stages but showed a vigorous leaf development at the end of the growing season. Three different leaf types were found in the F_1. Heterosis was observed in root development. The roots were very deep, cylindrical and forked; they resembled *B. macrorhiza* anatomically except for the absence of mechanical tissue, and their sugar content

* An extended summary of this paper is on file at the Bureau.

was 4·6–7·5%. Chromosome number was 18. The hybrids were less winter-hardy than F_1 *B. macrorhiza* x *B. lomatogona*. Flowering stalks resembled the wild parent, but floral characters were nearer to *B. vulgaris*. The pollen was sterile, and open pollination produced no seed; one glomerule set seed however, from pollination with sugar beet, and a plant was raised from it. This also grew slowly at first, but displayed great vigour towards the autumn; its leaves and roots approached the *B. vulgaris* type.

1136. Bordonos, M. G. 633.63:581.46:575
(Sugar beet forms producing one-seeded balls).
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1941 : No. 11 : 3–4.

The possession of one-seeded glomerules proved a recessive character but there was a strong association in the F_2 between the one-seeded character and late flowering. Most of the one-seeded forms failed to flower even in the second year but a few were found which flowered at the normal time, and gave a normal yield of seed of good germinating capacity.
The one-seeded character was transmitted to the progeny when such plants were either selfed or crossed together. Attempts to alter the number of seeds per glomerule in the one-seeded forms by environmental influences all failed.
Further breeding work is being carried out on the early maturing one-seeded forms and F_3 results indicate that the character can be combined with high yield and sugar content. These forms are also valuable on account of their reduced tendency to bolting.

1137. Finn, V. V. 633.63:581.46:575.14
(The teratology of the sugar beet flower).
Jarovizacija 1941 : No. 3 (36) : 144–45.

Various floral anomalies occurring in inbred sugar beet progenies are described.

STIMULANTS 633.7

1138. Jakovuk, A. 633.71:575.3
(The occurrence of interchanged dominance in some tobacco hybrids).
Jarovizacija 1941 : No. 2 (35) : p. 120.

Many F_1 tobacco hybrids resembled one parent in the lower part of the plant and the other parent above; when sown at a later date the entire plant resembled the upper half of the earlier sown plants, so the differences are ascribed to environmental influences.
Differences were observed between different F_1 individuals although the parents were apparently homogeneous.

1139. Sil'vestrov, V. G. 633.71:575.42
(Obtaining seeds of *Nicotiana rustica* on experimental plots).
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1941 : No. 11 : 7–10.

The best progenies were obtained from plants which themselves were in no way outstanding and often even inferior to others. Thus in the work of seed production selection by progenies rather than by individual plant characters is recommended.
It is thought that the loss of vigour in early inbred generations may often be ascribed to inappropriate selection.

1140. 633.71:576.16
Descubrimiento de un tabaco arboreo. **(Discovery of a tree tobacco).**
Ciencia, Mexico, D.F., 1941 : **2** : p. 364.

A tree tobacco, named *Nicotiana cordifolia*, has been discovered in one of the Juan Fernández islands and attempts are being made to cross it with other species.

1141. Croesen, V. R. Ij. 633.71–1.524:575(49.2)
Tabakscultuur in Nederland. **(Tobacco cultivation in Holland).**
Landbouwk. Tijdschr. Groningen 1940 : **52** : 145–64, 213–33.

he author deals with the history of tobacco cultivation in Holland and the identity of the species that have been introduced from time to time and from which the so-called "native" Dutch varieties have been obtained by natural selection of forms adapted to their environment. Apparently no systematic efforts to improve the Dutch tobacco by breeding have been made,

and it would be of great importance to discover whether the desirable and less desirable characteristics of aroma, flavour, burning quality and yield are determined by the variety or mainly by the influence of manuring, soil, climate, etc.
Whether research to improve and develop the Dutch tobacco crop would be economically justified is considered in the second part of the paper.

1142. HAAN, I. DE 633.72:581.44:575.061.1
De ontwikkeling en de vertakking van oculaties bij thee in verband met de eigenschappen van het oculatiehout en den onderstam. (**The development and the branching of buddings in tea in relation to the properties of the bud wood and the stock**).
Bergcultures 1941 : **15** : 1623–28.
Leaf production of tea plants is influenced not only by environmental factors but also by inherent factors in the plant and profuse branching and bud formation are frequently heritable. Selection is therefore directed to the discovery of favourable characters of this kind. In a budding or a graft leaf production may be influenced also by the special internal reactions between scion and stock and the writer investigated the influence of a vigorous stock and high-grade budding material upon leaf production. Since uniform material for stocks was not yet available, the variation in the stocks used for the experiment had to consist only in the size of their diameter. The buddings were taken from clone PG 17, from the selected clone Tjinjiroean 18 and from a plant from the Kedoeng Halang experimental plantation. The results with the selected and unselected material were confirmed.
On the thick stocks more shoots were formed from the "shield" area than on thin stocks; and the genetic tendency of the selected material (clone Tjin 18 and PG 17) was shown in the rapid growth of lateral buds, resulting in more profuse branching. The high production of these clones is thus a consequence of this characteristic of prolific branch formation.

1143. CHENEY, R. H. 633.72:581.6(73)
Tea substitutes in the United States.
J.N.Y. Bot. Gdn 1942 : **43** : 117–24.
A critical survey of numerous plants that may be regarded as tea substitutes worthy of serious trial in the United States.
Methods of preparation are also mentioned.

1144. LAMBERS, M. H. R. 633.73:575.42:575.12(92)
Koffieselectie en koffie-plantmateriaal. (**Coffee selection and coffee planting material**).
Bergcultures 1941 : **15** : 1522–32.
Further information is presented here on the results of selection in hybrids from controlled pollinations (cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 593) and on the complicated factors which determine yield (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 214).
The necessity for yield comparisons is stressed and the difficulties of obtaining reliable and full data for annual comparisons are exemplified. By selection, plant material should be obtained that is as little affected as possible by unfavourable environmental conditions and thus can maintain an average high level of production.
The difficulty of the problem of how to detect the trend of production of mother trees is mentioned and in an analysis of relevant data from Soember Asin on some mother trees and their clones a way of reconstructing missing production figures for mother trees selected many years ago is shown.
In comparing yields of old and new selections allowance must be made for the effects of planting on virgin soil in contrast to ground that has been long under cultivation. Spacing is also shown to be a factor that must not be ignored.
The performance of clone SA 13 demonstrates the danger of forming a judgment of a clone or seedling at too early a stage; it did not reach its high level of production until its 6th year, then surpassing the five best selections and maintaining this superiority ever since.
As regards quality in coffee, breeders have also been successfully occupied in increasing the size and number of beans. The hybrid Conuga SA. 36 x BP. 42 and its reciprocal have produced a number of new clones some of which have still larger berries and beans than BP. 42, a very large beaned type. A cross BP. 42 x SA. 94 (also a large beaned form) has given some

clones whose berries and beans are larger and heavier than ever before recorded for Robusta. The beans of SA. 814 (PB. 42 x SA. 94) weigh on an average 0·40 grm., i.e. 100% more than the ordinary market product from SA. 13 and Con. SA. 36 and nearly 43% more as compared with BP. 42.

A very important factor in yield is the size of the berry clusters. The clone SA. 1387 found at Soember Asin has the best filled clusters (e.g. in one example illustrated 116 ripe berries) that have ever been found so far in Robusta coffee. Since cluster size has proved heritable crosses of clones such as SA. 1387 with BP. 42 and SA. 814 should give important results. In addition crosses of Robusta with other varieties and of other varieties *inter se* should produce some valuable forms as Schweizer's selection work with Arabica–Robusta hybrids has shown. The improvements attainable by hybridization are also evident in the cross BP. 42 x the West African Kapakata coffee in which a considerable increase in the number of berries per cluster and their size was obtained. The excessive branching of the Kapakata—a most useful feature—has also been inherited to a large extent by the hybrid. Arabica, wild Robusta and various other coffee forms found growing wild in Central Africa were included in the selection programme at the end of 1938.

In the subsequent discussion the following points were raised: the yields from the new selections compared with the output from the seedlings on the estates; the resistance of the new types produced by the breeder to unfavourable climatic and other external factors; the so-called "contract" experimental plantation has been laid out to test the new forms under extreme climatic conditions.

1145. GRANER, E. A. 633.73:581.48:581.3

Embriogenese de *Coffea*. 1. Desenvolvimento do ovulo em "*Coffea arabica*" L. (**Embriogenesis in Coffea. 1. Development of the ovule in *C. arabica* L.**).

An. Primeira Reunião Sul-Amer. Bot. 1938 : **3** : 193–201.

The development of the anatropous ovule, megaspore and embryo sac of *C. arabica* is described, with diagrammatic and photographic illustrations. The author disagrees with Houk (cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 1284) in that he finds the nucellus and endosperm quite distinct.

1146. GELIN, O. and 633.75:581.148:575
SCHWANBOM, N. 633.75.00.14(48.5)

Erfarenheter från årets vallmoodling. (**Results from the year's poppy cultivation**).

Lantmannen 1941 : **25** : 739–40.

In connexion with the promotion of poppy cultivation as a new crop in Sweden comparative trials were held at Weibullsholm to ascertain the differences in the degree to which varieties are modified by environment in regard to the amount of shedding of the seed even in types designated as non-shedding.

The German variety Mahndorfer imported by the Swedish Grain Company for cultivation in Sweden showed the defect in all experiments as did also the Blauer Mohn and to some extent the Hatvaner Mohn. Peragis and Alkaloida alone were free from it.

The supposed danger of the spread of poppies as weeds following cultivation proved to be unfounded but a warning is given that germination in the capsule may occur in warm humid weather: the remedy is early sowing and the avoidance of late ripening varieties.

CONDIMENTS 633.84

1147. 633.84:576.312.35:576.312.34

WALKER, R. I. 633.84:576.354.4

Chromosome number of *Zanthoxylum americanum*.

Bot. Gaz. 1942 : **103** : 625–26.

For staminate plants of *Zanthoxylum piperitum* Sinotô reported a haploid chromosome number of 35 and Nakajima confirmed this number and also the presence of a univalent and one unequal pair of chromosomes at metaphase (cf. "Plant Breeding Abstracts", Vol. IX, Abst. 127).

A study of the American species *Z. americanum* has revealed 34 pairs of chromosomes at metaphase II and other stages of meiosis. In spite of the fact that lateral views of microspore

and macrospore mother cells during first metaphases and anaphases were examined, it was impossible to distinguish all chromosome pairs distinctly in one view; but of the chromosomes observed, all were paired and the chromosomes of each pair were of the same size and shape.

1148. SCHUPHAN, W. 633.842
Gemüsepaprika, eines unserer wertvollsten Gemüse. (**Sweet pepper, one of our most valuable vegetables**).
Forschungsdienst 1941 : **12** : 615–17.

Sweet pepper (pimento) can be grown in the neighbourhood of Berlin. It has a vitamin C content of 80 to 250 mg. %, very little of which is lost in cooking and the extension of its use as a vegetable is urged. A brief history of the plant is given. Certain sugary, dessert forms are specially recommended and the desirability of extending breeding work with this plant is noted.

1149. TOMPOS, A. 633.842:581.47:575–183:578.08
A füszerpaprikahüvely héjvastagságának mérése. (**On the determination of the thickness of the pericarp of the spice paprika**).
Rep. Hung. Agric. Exp. Sta. 1939 : **42** : 285–88.

The thickness of the pericarp of the paprika used for spice is an important factor in the manufacturing process. Thick types give a higher output of powder and also a sweeter and more aromatic product than thin ones. Selection of varieties with thick pericarps is therefore a constant aim in breeding. Instead of the prevailing method of measurement of the thickness by mechanical means, the author suggests the weighing of portions of the pericarp measuring 1 cm^2 each, using a laboratory cork borer for obtaining the samples.
A direct and constant correlation is stated to exist between the weight of the unit area of pericarp and the quantity of the alcoholic extract therefrom.

1150. SCHWANITZ, F. 633.844:576.356.5:581.48
Über den Einfluss des Entfernens der Keimblätter auf die Entwicklung und den Ertrag von diploidem und autotetraploidem gelbem Senf (*Sinapis alba*). [**The influence of removing the cotyledons on the development and yield of diploid and autotetraploid yellow mustard** (***S. alba***)].
Züchter 1942 : **14** : 86–93.

The plant weight at the beginning of flowering was distinctly higher in tetraploid plants produced by colchicine treatment than in the corresponding diploids. Removal of 1 cotyledon caused a decrease in yield, the decrease being more marked in the 4*n* than in the 2*n* plants, with the result that in the plants so treated the 4*n* was very little higher than the 2*n* yield. A still greater diminution in yield resulted when both cotyledons were removed and in this case the yields of the 2*n* and 4*n* plants were about equal. The difference in cotyledon size is therefore regarded as a very important factor in determining the greater development of the tetraploid plants in the early stages.
At the time of maximum flower production however the weight of the 2*n* and 4*n* plants was almost equal, both in plants with 2 and with only 1 cotyledon. Plants with both cotyledons removed were again somewhat depressed in yield but less noticeably than in the earlier stages. Plant weight at the end of flowering was greater in the 4*n* than the 2*n* plants (normal) but in plants with 1 or no cotyledon no difference was observed. At the time of seed maturity the diploid plants weighed more than the tetraploids; the 2*n* plants without cotyledons were about equal in weight to those with both cotyledons and in the 4*n* plants the difference was very slight. The experiments show therefore that the initial advantage conferred by a greater store of reserve materials is lost in the course of development.
The number of leaves was greater in the diploids, the weight of a single leaf greater in the tetraploids; at seed maturity both number and weight of leaves was greater in plants with cotyledons removed, which is an indication that these plants are in a younger developmental stage. Shoot length in the early stages was greater in the 2*n* plants and was influenced by cotyledon number; in the later stages no such influence was evident and the shoots of the 4*n* plants were the longer. The shoots were thicker in the 4*n* plants, especially in the early phases; the removal of the cotyledons affected this character only in the early phases.
The 4*n* plants produced a much smaller number of seeds than the diploids; although this is probably in part ascribable to meiotic irregularities it is undoubtedly partly conditioned also by the smaller number of inflorescences on the tetraploid plants.

1151. Baur, G. 633.844:581.162.3
Bestäubungs- und Befruchtungsverhältnisse bei weissem Senf (*Sinapis alba* L.). [**Pollination and fertilization in white mustard (*S. alba* L.)**].
Züchter 1940 : **12** : 189–93.

The experiments showed that while in nature, white mustard has a tendency to cross pollination, spontaneous self-pollination is possible. The amount of seed set is reduced when the plant is isolated. It was found that the average 1000 seed weight per plant is higher, the smaller the number of seeds per individual pod. This, however, is not to be considered as a correlation of value to breeding as many individual plants show great variation. R. M. I.

OIL PLANTS 633.85

1152. Drobinski, B. N. 633.853.49:581.48:575.114.061.6
(Segregation in the F_2 generation of grey mustard as indicated by colour of seed and Mendel's "Law").
Jarovizacija 1941 : No. 3 (36) : 117–18.

A grey seeded variety of *Brassica juncea* var. *sareptum* was crossed with a yellow seeded variety and each of the 24 F_1 plants obtained was sown separately. Only 2 of the F_2 families showed a Mendelian ratio of grey: yellow seeds; the rest deviated in varying degrees, the ratio of grey: yellow varying from 3·75 : 1 to 1 : 4·75 in different families. The deviations are ascribed to selective fertilization.

1153. Knapp, O. 633.854.78:575(43.91)
Sonnenblumenzüchtung in Ungarn. (**Sunflower breeding in Hungary**).
Züchter 1940 : **12** : 193–99.

The first objective, in view of the variation in the available material, was the creation of a uniform type; then follows the increase in the yield of seed and the increase in kernel percentage of the seeds which leads indirectly to an increase in oil and protein content. These aims can be readily achieved by selection.
Breeding for a one-flowered plant is desirable as such a plant produces a better yield and larger seeds.
The possibility of selection on the basis of coloration of the hypocotyl is discussed as is also the production of pest resistant varieties. R. M. I.

1154. Pustovoit, V. 633.854.78:575(47)
(New varieties of sunflower).
Sotsialističeskoe Sel'skoe Khozjaistvo (Socialistic Agriculture) Moscow 1941 : No. 2 : 88–89.

New varieties with higher oil content (up to 52%) combined with resistance to *Orobanche* race A and others resistant also to race B with oil contents up to 46% have been produced. All are good in yield too.

1155. *Shchibrya, N. A. 633.854.78:575.127.2:635.24
[**A cross between Jerusalem artichoke (*Helianthus tuberosus*) and sunflower (*Helianthus annuus*)**].
Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : 66–84.

Over 2,000 artichoke-sunflower crosses were examined, the artichoke being used as the female parent. Variation between F_1 plants of the same cross was great. Heterosis was often observed in respect of height and thickness of stem and number of leaves. The eyes of hybrid tubers were more apt to sprout and the stolons were shorter than those of the artichoke. The F_1 hybrids flowered abundantly but less than 10% of them formed seed and only two gave a substantial amount (10–15 seeds per inflorescence). Chromosome number was intermediate between the parents ($2n = 68$).
The later flowering of the artichoke was incompletely and irregularly dominant and the rust resistance of the same parent was completely dominant in all the F_1s. Variations were observed in carbohydrate and protein content of F_1 tubers; in some, sugar content was particularly high, constituting about half the dry weight in one case. These forms are thought

* An extended summary of this paper is on file at the Bureau.

to be of interest for syrup manufacture, while a sweet flour containing 50% of sugar can be extracted from the dried stems.
The best of the hybrids give a yield of 400 c. per ha. of green fodder suitable for silage. The leaves contain 0·43% of rubber on a dry weight basis and it is thought that this could be increased by breeding.
The F_1 plants form seed only when back-crossed to the sunflower; the second generation are therefore closer to the sunflower type. They are annuals with at most a few rudimentary tubers. Their fertility is very low and chromosome number varies from 40 to 52. Odd plants with up to 20% fertility have been found. This generation was all rust resistant. Seed is produced in most cases only by pollinating with the sunflower and the F_3 and F_4 obtained in this way are annuals without tuber formation, with strong resemblance to the sunflower. One constant F_4 family, rust resistant but of low fertility, was obtained. It is suggested that low fertility and rust resistance are correlated, though in some instances the correlation is broken. No forms combining immunity from rust with 100% fertility have, however, yet appeared and the best are too much branched and have small heads and seeds.
Hybrids were also obtained by pollinating the semi-wild "female" sunflower with the wild species *H. macrophyllus* and *H. tuberosus* v. *purpurellus*. The hybrids resembled the pollen parent; all were perennial and bore tubers and were quite fertile. An F_2 of sunflower x *H. macrophyllus* very much resembled the F_1 in habit; all were excessively late in flowering and therefore formed no seed.
It seems possible, in view of these results, that a perennial sunflower may more readily be obtained by crossing with wild species such as *H. macrophyllus*, *H. rigidus* and *H. tuberosus* v. *purpurellus*. A number of further crosses with these species have been made and very high fertility observed.
Grafts between different *Helianthus* species were nearly all successful. No alterations were observed in the seed progeny of grafts of artichoke on sunflower.

1156. I. S. 633.854.78:575.3(47)
(Seminar for sunflower breeders).
Jarovizacija 1941 : No. 3 (36) : p. 133.
The conference recommended more attention to out-pollination to increase the yields, to the principles of phasic development, to the provision of optimum conditions of growth for the breeding material and to intra-varietal crossing.

1157. Morozov, V. K. and Galaktionova, A. M. 633.854.78:581.162.32
(Spatial isolation in breeding and seed production of sunflowers).
Jarovizacija 1941 : No. 2 (35) : 43–46.
A number of sunflower varieties differing in type were grown together without isolation. None suffered a loss of yield in consequence and many were improved in yield, sometimes quite considerably, especially varieties produced by inbreeding. Quality was sometimes adversely affected, e.g. when a variety with low husk percentage and high oil content was grown in the proximity of a low quality variety. If varieties of similar type and quality are grown together however no deterioration in quality occurs.

1158. Ljaščenko, I. F. 633.854.78–2.5–1.521.6:575.3
(The influence of external conditions on segregation in the F_2 generation of sunflower hybrids).
Jarovizacija 1941 : No. 3 (36) : 114–17.
F_2 sunflower hybrids contained a much higher percentage of plants attacked by *Orobanche* in 1939, which was an excessively dry year, than in 1940, a moist year.

MEDICINAL PLANTS 633.88

1159. Georgieff, C. 633.88(49.7)
(Cultivation and collection of medicinal and aromatic plants in Bulgaria).
Minist. Agric. St. Lands. St. Exp. Field Sta.—Kazanlak 1940 : Pp. 271.
This monograph contains a short historical introduction on the use of medicinal plants with special reference to the position in France, Germany, Italy, Belgium and Bulgaria. In the

last named country several organizations exist for promoting interest in the collection and use of medicinal plants.
Descriptions and indications of the properties and uses of 70 plants are given with their popular, Latin and English names and also illustrations.
The appendix (1) deals with the collection, preparation, drying and preservation of wild medicinal plants and their cultivation and distillation; and (2) contains lists (*a*) of the relative weights of the fresh and dry plants and (*b*) of times of flowering and collection of the useful portions of the various plants.

1160. WULFF, H. D. 633.88:576.356.5
Über die Ursache der Sterilität des Kalmus (*Acorus calamus* L.) (**The cause of sterility in calamus (*A. Calamus* L.).**
Planta 1940 : **31** : 478–91.

Calamus is sterile in Europe and has to be propagated by rhizomes. The chromosome number of *A. gramineus* Soland. was found to be $2n = 24$. A study of *A. Calamus* revealed a polyploid series of diploid, $2n = 24$, triploid, $2n = 36$ and tetraploid, $2n = 48$. Of these the triploid plants were sterile and a study of meiosis showed considerable irregularity and the presence of trivalents. R. M. I.

RUBBER PLANTS 633.91

1161. O. . . . . , F. W. 633.912:001.4
Moet onze rubberboom herdoopt worden? (**Must our rubber tree be renamed?**).
Bergcultures 1941 : **15** : 1438–40.

A critical examination of O. F. Cook's suggestion that the name *Hevea brasiliensis* should be changed to *Siphonia ridleyana*. Historical evidence and systematic nomenclature provide the basis of the writer's argument.

1162. DIJKMAN, M. J. and
OSTENDORF, F. W. 633.912:575
Zaailingentoetstuin Pangkalan 1929. (**Seedling test-garden Pangkalan 1929**).
Arch. Rubbercult. Ned.-Ind. 1941 : **25** : 435–65.

In 1929 a test of rubber seedlings obtained by hand pollinations from families from 8 crosses involving the clones BR 2, PR. 106, Tjir II, III, VIII and X and Planterstrots 4 was begun at Pangkalan on the Pondok Gedeh Estate, some few gaps being subsequently filled in by stumps from hand-pollinated seeds of clone BR 2 x PR 107 and its reciprocal, and by some illegitimate familes from clone BR 2 and the mother tree CRS 4 (PR 126).
Measurements in 1940 suggested that 3 different hybrid families which had Tjir II as one parent had the lowest circumference growth, though there is not enough evidence to conclude with certainty that Tjir II should transmit the "slow growth" character to its progeny.
Among the good growers were the family Tjir X x Tjir III (which was superior in bark thickness as well as in growth), BR 2 x PR 106 and the illegitimate seedling BR 2.
Though no definite conclusions can be drawn as to the genetical constitution of the Tjirandji families in regard to bark thickness, Planterstrots 4 seems to have a genotype which conditions thin bark. The highest average for this character was attained by Tjir II x VIII and the lowest by Tjir VIII x Planterstrots 4.
As regards the yield from the Tjirandji families, though cross Tjir VIII x Tjir II was remarkable for a relatively high yield, this is thought to be in all probability due to chance and does not represent the normal performance of this family. The yield of Tjir II x Tjir VIII, Tjir VIII x Planterstrots 4 and Tjir VIII x Tjir X all exceeded 5 kg. in their 4th or 5th tapping year. Tjir VIII may, it appears, be transmitting high yield to its progeny; and none of the Tjir families that failed to reach the 5 kg. output in any year had Tjir VIII as one of the parents.
The BR 2 x PR 106 family showed on the average a somewhat higher yield than the best Tjirandji families.
Tjir VIII x Planterstrots 4 showed much the lowest amount of brown bast disease.
Cramer and Schmöle's methods were used in a testatex test (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 195, and Vol. VII, Abst. 1342) of seedlings of the BR 2 x PR 106 family and in

spite of certain admitted discrepancies in the data obtained in this particular test, some interesting conclusions are drawn as to the value of the technique in selection work.
Statistical treatment of the experimental data on yield showed (1) that the correlation between the first tapping year and for five years justifies the carrying out of thinning operations in the 1st year; (2) that a correlation also exists between the 1st and 5th years but is not sufficiently close to be used in the selection of the very high yielding individuals required for the ultimate selection of mother trees. A separate investigation with BR 2 (illegitimate), BR 3 x PR 107, PR 126 illegitimate and Tjir X x Tjir III, however, showed that clones made from the best 10% of the seedlings would eventually be found to contain a good proportion of the highest producers for use as mother trees.
Correlation ratios for circumference in 1934 and 1940 were examined for 4 families.

1163. VONK, H. 633.912:581.165.1:575.42(91)
De voorlichting der zg. small holders in Malaka op het gebied van de rubbercultuur. (**The instruction of the so-called small holders in Malaya as regards rubber cultivation**).
Landbouw 1941 : **17** : 259–90.
The importance of selecting superior planting material (buddings in particular) is emphasized in the course of observations on the comparative advantages and disadvantages of various clones and the available supplies of stocks and buddings.
The work of the Sungei Buloh Experiment Station is discussed, the performance of the clone Pilmoor B 84 being specially mentioned as demonstrating that clones can be found that equal seedlings in growth, thickness of bark and in bark regeneration. This clone also showed a complete absence of "elephant's foot."
Density of planting and its effects on bark regeneration are also considered.

1164. OSTENDORF, F. W. 633.912:581.165.1:575.42(92)
Resultaten van toetstuin 1930 (Proeftuin Tjiomas) tot en met het zevende tapjaar. [**Results from the trial plantation (Tjiomas experimental plantation) up to and including the 7th tapping year**].
Bergcultures 1941 : **15** : 1630–37.
A continued record of performance (cf. "Plant Breeding Abstracts", Vol. IX, Abst. 1584 and 1583) of various AV, Lamp, Pil, PB, BD, Hen, CT and other rubber clones. (See Horticultural Abstracts).

1165. 633.912:581.165.1:581.143.7(92)
Aanbevolen *Hevea*-plantmateriaal 1941–1942. (**Recommended *Hevea* planting material 1941-1942**).
Bergcultures 1941 : **15** : 1692–709.
These recommendations, issued by the Experiment Stations of the Central Association of Experiment Stations (Netherlands East Indies) replace those in the communication already reviewed (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 776).
As before, detailed information is given about clones recommended for large scale and small scale planting and about clones no longer included among those suitable for general recommendation.
Progenies of seedling families, some of hybrid origin and some from self-pollinations, are critically discussed.
Records of performance are also shown in numerous tables.

1166. 633.912:581.165.1:581.143.7:001.4(92)
Uniformiteit in de aanduiding van *Hevea*-plantmateriaal. (**Uniformity in the description of *Hevea* planting material**).
Bergcultures 1941 : **15** : 1560–63.
In view of the errors and confusion to which present use in the nomenclature of rubber clones and seedlings has on occasion given rise, a series of designations (in full and abbreviated) for the various clones and seedlings has been formulated after consultation between the Java Experiment Stations and the Avros General Experiment Station; and it is hoped that planters and others concerned will co-operate by adopting the new methods, thereby eliminating synonymy and polyonomy.

A card giving the essentials of the new system was issued as a separate in the Archief voor de Rubbercultuur, Volume 25, No. 5.
Under the heading types of plantings including seedlings, seed gardens and mixed plantations definitions are given of the proper and the popular uses of various designations for different categories of seedlings (e.g. illegitimate, propelegitimate, etc.), with useful comments on existing usages and suggested reforms.

1167. 633.912:581.165.711:575.127.2
BIE, G. J. VAN DER 633.912:581.6(92)
Onderzoek van latex, verkregen van oculaties op *Hevea spruceana* hybride onderstam en op *Hevea brasiliensis* onderstam. (**Investigation of the properties of latex, obtained from buddings on stock of *H. Spruceana* hybrid and of *H. brasiliensis***).
Arch. Rubbercult. Ned.-Ind. 1941 : **25** : 503–09.
An investigation in continuation of the work already reviewed (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 565).
Tests of the properties of the latex, its chemical composition, creaming, vulcanization and durability were carried out and in general the effect of the stock was found to be less than the clonal differences. The *Spruceana* hybrid stock produced no special features in the latex from the buddings grown on it; the latex may be regarded as equalling ordinary *Hevea* latex.

1168. 633.912–2.4–1.521.6(92)
633.912–1.524:575(92)
Rubbercultuur in tropisch Amerika. (**Rubber cultivation in tropical America**).
Bergcultures 1941 : **15** : 1373–82.
Een aanstaande rubberboom in tropisch Amerika? (**A coming rubber tree in tropical America**).
Ibid 1941 : **15** : p. 1638.
A survey for the Netherlands East Indies of Brandes' account of efforts to promote rubber cultivation and improvement in the western hemisphere (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 1065).
The second paper deals with the economic background of the problem in the light of more recent events.

1169. *LYSENKO, T. D. 633.913:581.142
(**Good germination of kok-saghyz ensures a high yield**).
Jarovizacija 1941 : No. 3 (36) : 3–11.
Defective germination has been one of the limiting factors in cultivating kok-saghyz. Measures are described for overcoming this.
A method of using cut roots for multiplication is described too; it is thought to be of use for breeding work and possibly also on a field scale.

1170. FILIPPOV, D. I. 633.913:581.6:575(47)
(**Some problems of breeding kok-saghyz**).
Jarovizacija 1941 : No. 3 (36) : 21–28.
When grown under wide spacing the root of *Taraxacum kok-saghyz* grows to a weight of 100–200 grm. Figures are given showing that the rubber content is greater in branched than in unbranched roots, and that the present tendency to select unbranched roots is erroneous. Analyses of 312 roots, the results of which are presented, show that the rubber content is in inverse proportion to the diameter of the root, since in most roots the latex vessels are less concentrated in the peripheral layers than in the centre of the root. Certain types of root exist however with rings of cambium scattered irregularly among the cortex. It would seem that by selecting this type it should be possible to raise both the size and rubber content of the roots.
Leaf type is shown to be very much influenced by environment and is not a suitable character on which to base selection.

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* An abridged translation of this paper is on file at the Bureau.

1171. MYNBAEV, K. 633.913:581.6:575.3
(The effect of time of harvesting of seed on the capacity for rubber accumulation in the progeny).
Jarovizacija 1941 : No. 3 (36) : 29–31.
Seeds of *Taraxacum kok-saghyz* gathered at different stages of maturity differed in appearance and gave rise to plants which differed in rubber content and other characters.

1172. GORIAINOV, M. N. 633.913:581.6:578.08
(A method for determining the content of gum in live roots of caoutchouc bearing plants).
Proc. Lenin Acad. Agric. Sci. U.S.S.R. 1941 : No. 11 : 5–6.
Periodical determinations were made of the electromotive force of the roots of growing plants of kok-saghyz and the values were found to be correlated with the rubber contents of the roots examined.

FRUITS 634

1173. FAES, H. 634:575(49.4)
Station fédérale d'essais viticoles et arboricoles à Lausanne et Domaine de Pully. **(Federal Station for viticultural and arboricultural experiments at Lausanne and Domaine de Pully).**
Landw. Jb. Schweiz 1941 : **55** : 703–38.
The Lausanne Station has made some crosses with different varieties of late pears and it is hoped that some of the seedlings will be found to combine hardiness and good keeping quality. Owing to widespread attacks by *Didymella applanata*, the propagation of resistant varieties of raspberries is being undertaken.
The gooseberry varieties, Hollandaise rouge, Eastling aus Vierlanden, Versaillaise blanche and Haughton Castle, have shown themselves highly resistant to *Pseudopeziza ribis*.
Some new vine varieties (direct producers) were introduced in 1939 and 1940 for trials.
Investigations on the preservation of grapes show that in general the Chasselas and fine skinned varieties do not keep well and for long term preserving, types with tougher skins are needed.
New varieties of apples, pears and cherries have been introduced by grafting; and variety trials of apples from different countries, including the Kalterer Böhmer of the Tyrol are in progress.
Among the local plum varieties being studied is the very early Ruth Gerstetter which has flowered for the first time.

1174. 634:575(73)
Small fruits.
Amer. Fruit Gr. 1942 : **62** : No. 5 : p. 8.
The varieties referred to include the Tennessee Shipper strawberry, a cross between Missionary and Blakemore, smooth and uniform and good for transport; Sodus cherry, rated one of the best of the light-coloured cherries, earlier than Victor and one of the best in quality; Indian Summer, an autumn fruiting raspberry.

1175. MICHURIN, I. V. 634:575.127
(Results of sixty years of plant breeding work and further prospects).
Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : 5–9.
In this article, first published in 1934, Michurin describes his early failures in introducing southern forms into the north, in mass selecting among seedlings of southern and imported forms, and in crossing the local forms among themselves. Finally he came to the method of crossing between forms of different geographical origin, which gave the most successful results. At the time of the October revolution 800 different species were growing in the author's collection and when the State took this over in 1919 there were 154 improved varieties of fruits, including 45 apple varieties, 20 pears, 15 plums and 13 sour cherries. At the time of writing the total number of varieties was over 300. The author urges that the work of multiplying the most promising of these varieties should be extended and accelerated, that further expeditions in search of initial material should be organized, especially to the Far East, and that the principles of plant breeding should be more widely taught in agricultural schools and colleges.

1176. REHDER, A. 634:582
New species, varieties and combinations from the collections of the Arnold Arboretum.
J. Arnold Arbor. 1939 : **20** : 85–101, 409–31.
The article contains reference to various new or hybrid species or forms of *Sorbus*, *Malus*, *Pyrus*, *Prunus* and other fruit or forest trees.

1177. 634.2:575.127
JAKOWLEV, P. N. 634.25–2.111–1.521.6:575.127.5
(Intergeneric hybridization in stone-fruit trees).
Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : 34–38.
Flowers of the wild sloe (*Prunus spinosa*) were pollinated with a mixture of pollen from different cultivated peach varieties from Erevan. The two hybrids obtained in 1936/37 differed from the sloe in many respects, in some of which they resembled the peach, in others a plum. Further seedlings obtained in 1938 showed many resemblances to the peach. Buds from the hybrids were grafted on to peach, sloe, sand cherry (*P. Besseyi*) and Chinese plum. The leaves of the grafts were mostly removed so as to attain the maximum effect of the stock on the scion.
In 1937 and 1938 two hybrid seedlings were obtained from crosses between *P. Besseyi* and peach and have been grafted on to *P. Besseyi*; these two seedlings were the first to be produced from 195,000 flowers of this combination pollinated. The combination can now be made with ease however by using the various bridging hybrids containing *P. Besseyi* in their parentage—e.g. Hansen's *P. Besseyi* x *P. salicina*. Hybrids of the Okia plum with the Amsden peach, themselves complex hybrids, were obtained in 1938; they contain in their parentage *P. Besseyi*, *P. Munsoniana*, *P. salicina* and *Persica vulgaris*. At the age of 4 months the hybrids began to form flower buds; were destroyed by the winter but the trees themselves remained undamaged.
Crosses have also been made between Michurin's Posrednik peach and naturally occurring peach-almond hybrids. The author is confident that the next 3–5 years will witness the production of a high quality hardy peach.

1178. 634.22:575(73)
634.75:575(73)
New fruits.
Amer. Fruit Gr. 1942 : **62** : No. 4 : p. 8.
Varieties referred to include the Pipestone plum, outstanding in productivity, size, appearance and quality; Redcoat plum, resembling Red Wing but more resistant to leaf spot and brown rust; and various new strawberries.

1179. ENIKEEV, KH. K. 634.23:575.127.2:575.3
(An example of the influence of the stock on the formation of characters in inter-species cherry hybrids).
Jarovizacija 1941 : No. 2 (35) : 103–04.
A hybrid of *Cerasus Besseyi* Bail. x *C. tomentosa* Thunb. was made in 1936 and 38 hybrid seedlings were grown in 1937. Twigs from the one year old seedlings were grafted on to both parental species. The grafts on *C. Besseyi* acquired much more resemblance to that species in form, colour and flavour of fruits, which contained 1½ more tannin than the fruits from the same seedling ungrafted. Grafting on to *C. tomentosa* reduced the tannin content.
Some seedlings on the other hand showed no effect on being grafted.

CITRUS FRUITS 634.3

1180. ZORIN, F. M. 634.3:575.127.2
(First hybrid citrus-fruits).
Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : p. 118.
Hybrids of Unshiu x lemon have proved as winter-hardy as Unshiu and bear fruits of attractive flavour. Unshiu x Shiva Mikan exceeded Unshiu in hardiness and bore fruits similar in quality, some of which ripened somewhat earlier.
A seedling of Duncan grapefruit, equal to Duncan in size and quality of fruit but distinguished by much greater winter-hardiness, has been named the Sochi grapefruit.
Many other hardy hybrids have not yet come into bearing.

1181. HERRERO EGAÑA, M. and ACERETE LAVILLA, A. 634.31:582
Variedades del naranjo. **(Orange varieties).**
Bol. Inst. Invest. Agron. Madr. 1942 : No. 6 : 125–31.
A list is given of a large number of varieties of *Citrus sinensis* Osbeck, with indications of their synonyms, the country in which they are grown and bibliographical references to sources from which full descriptions may be obtained.

NUTS 634.5

1182. MCKAY, J. W. 634.51:575.127.2:576.356:581.162.5
Infertility in hybrid walnuts.
Rep. Proc. 32nd Annu. Mt. Nth. Nut Gr. Ass. Hershey, Pa 1941 : 84–86.
Studies have been made of two hybrids of *Juglans regia* L. x *J. nigra* L. Both were intermediate in type and low in fertility; 9 seedlings were obtained from 1 tree and 6 from the other. The seedlings showed wide variation in foliage characters and growth rate. Though both parents have the somatic chromosome number 32, pairing in the hybrids was very irregular and no seed was set when the hybrids were pollinated with pollen from either of the parent species. The few nuts produced by an infertile hybrid are, it is stated, likely to yield seedlings that are new and valuable individuals, since each seedling has a chance of showing the desirable characteristics of both its parents in new combinations.

1183. 634.53–2.421.9–1.521.6
BEATTIE, R. K. 634.53–1.524(5)
The search for blight-resistant chestnuts in the Orient.
Rep. Proc. 32nd Annu. Mt. Nth. Nut Gr. Ass. Hershey, Pa 1941 : 18–23.
A thorough study of the chestnuts of Japan, Korea, Formosa and China has been made in search of a substitute for the American chestnut, which has been killed out completely by chestnut blight (*Endothia parasitica*). The article contains a description of the 4 species *Castanea crenata*, *C. mollissima*, *C. Henryi* and *C. Seguini*, their habitat, varieties and main properties.

1184. DAHLGREN, K. V. O. 634.54:581.45:575.247.061.1
En ny varietet av hassel med ascidieblad samt om *Corylus avellana* L. var. *Zimmermanni* Hahne. **(A new variety of hazel with an "ascidium" leaf—and on *C. avellana* L. var. *Zimmermanni* Hahne).**
Svensk Bot. Tidskr. 1941 : **35** : 353–60.
A peculiar hazel bush found in the neighbourhood of Uppsala is described. The "ascidium" leaves have fused basal lobes so that at first sight the leaf may appear entire.
The peculiarity is attributed to a bud mutation. Some branches with normal leaves were found on the same bush and these are assumed to be genotypically heterozygous *Aa*, while the abnormal branches are presumably *aa*.

1185. SCHREIBER, W. R. 634.575(81)
The Amazon Basin brazil nut industry.
Foreign Agric. Rep. U.S. Dep. Agric. 1942 : No. 4 : Pp. 36.
The bulletin includes a description of the nut and the tree (*Bertholletia excelsa*), the climatic conditions in which it grows and the manner of its utilization.

PALMACEOUS AND OTHER TREE FRUITS 634.6

1186. BAILEY, L. H. 634.6:582(69.82)
Palms of the Mascarenes.
Gentes Herbarum, Ithaca, N.Y. 1942 : 6 (2) : 51–104.
A botanical study of the Mascarene palms with an historical account of the Islands and the ecological background, with photographs and sketches of various species of palms and their seeds, etc. (cf. Abst. 1187).

1187. BAILEY L. H. 634.61:582(69.6)
Palms of the Seychelles.
Gentes Herbarum, Ithaca, N.Y. 1942 : **6** (1) : 1–48.
With the assistance of various collaborators (including F. L. Squibbs and D. Vesey-Fitzgerald)

collections and studies of all the native palms of the Seychelles have been made and the descriptive account of them given here includes some excellent illustrations of the various types of nuts and inflorescences, etc.
The six species of Seychellan palms which represent six distinct types belong to six genera and are all endemic to the archipelago.

1188. ROUNDS, M. B. 634.653:575(79.4)
Observations on the Avocado variety situation.
Yearb. Calif. Avocado Soc. 1941 : 30–34.
Promising new varieties which are being planted in sufficient numbers to be studied from a commercial standpoint are Edranol, Hass, MacArthur, Henry's Select, Ryan, Hellen and Coit. Information is also supplied on production trends and registered varieties.

1189. POPENOE, W. 634.653:576.16
The Avocado—A horticultural problem.
Yearb. Calif. Avocado Soc. 1941 : 79–85.
Information is supplied on early history, origin of the cultivated avocados, species, and development of commercial varieties.

SMALL BUSH FRUITS 634.7

1190. 634.71:582
ALLANDER, H. 634.71:576.312.35
Om den Svenska s. k. *Rubus nemorosus*. (**On the Swedish so-called *R. nemorosus*).**
Svensk Bot. Tidskr. 1941 : **35** : 287–95.
The taxonomic vicissitudes of this species (mentioned in 1813 in Hayne's study of medicinal plants) are retailed and a new designation for it, *R. aureolus*, is proposed by the author, with a full description in Latin and Swedish.
The somatic chromosome number is given as 28.

1191. KUZMIN, A. J. 634.711:575.127.2:634.715
(Hybrid of raspberry and blackberry).
Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : 116–18.
The cross was very much more successful when the raspberry was taken as the maternal parent, when a set of up to 41·7% was attained. Out of 820 seeds from the cross Orekhovka raspberry ($2n = 21$) x Prolific blackberry ($2n = 42$) however only 11 mature seedlings were obtained; these had chromosome numbers varying from 35 to 42, and varied in fertility. Two seedlings distinguished by high fertility and large berries were selected, one of which failed to survive the winter. The other gave a good yield of fine large fruit, free from the hard seeds associated with blackberries and producing excellent jam.
Seed from open pollination of the hybrid has been sown and the F_2 seedlings have also shown themselves to be winter-hardy.

1192. HAHN, G. G. 634.72–2.452–1.521.6:577.8
Field tests with a staminate clone of alpine currant immune from blister rust under greenhouse conditions.
Plant Dis. Reporter 1941 : **25** : 476–78. (Mimeographed).
Infection experiments with this ornamental species confirmed earlier greenhouse tests demonstrating the susceptibility to *Cronartium ribicola* of the pistillate plants in the experimental material, while the staminate plants remained immune.

1193. TOLMACHEV, I. A. 634.723:575.127.2
(Hybrids of Crandall-currant with black-currant).
Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : p. 115.
The berries of the Crandall currant (*Ribes odoratum* Wendl.) split when ripe; it was pollinated with the blackcurrant and gave vigorous hybrids which flowered in the fourth year.

1194. JEFFERS, W. F. and DARROW, G. M. 634.75–2.411.4–1.521.6:575(73)
Promising strawberry crosses resistant to the red stele disease.
Trans. Peninsula Hort. Soc. 1941 : **31** : No. 4 : 20–23.
An account is presented of the work done under a co-operative project between the United States Department of Agriculture and the University of Maryland. Of approximately 10,000 seedlings tested, 2,300 have been selected for resistance to red stele (*Phytophthora fragariae*). Details are supplied of the varietal crosses and their grouping regarding resistance and fruit quality.

VITICULTURE 634.8

1195. JACOB, H. E. 634.835(79.4)
Grape growing in California.
Circ. Calif. Agric. Exp. Sta. 1940 : No. 116 : Pp. 80.
The bulletin contains a complete account of vine growing in California and ends with a description of the main varieties.

1196. P . . . . . , E. 634.835:575.247
Tokayer oder Ruländer? (**Tokay or Ruländer?**)
Schweiz. Z. Obst- u. Weinb. 1942 : **51** : 25–26.
The evidence on the identity of the so-called Tokay vine in Switzerland is examined; the writer inclines to the view that this and Ruländer are both synonyms of the French vine Malvoisie or Pinot gris and have nothing to do with the true Hungarian Tokay. The variety in question gives frequent sports bearing blue in place of red berries.

1197. SCHERZ, W. 634.835:575.247:576.356.5
Über somatische Genommutanten der *Vitis* vinifera-Varietät "Moselriesling". (**Somatic genom mutations of the *V. vinifera* variety Moselriesling**).
Züchter 1940 : **12** : 212–25.
The morphological and physiological characters of some stocks of the variety "Moselriesling" which have been found to possess sectors of tetraploid tissue, are described in detail. Also two further stocks have been found in which the mutation was complete.
The size of the bunches and of the grapes themselves was about doubled in the tetraploid parts. The seeds were not much larger than those of the diploid nor was the thousand grain weight greatly increased. It is noted that the leaves of the tetraploid had a greater tendency to be toothed than those of the diploid and also showed differences in size.
Seed from the tetraploids was grown and the seedlings showed marked differences in their habit of growth.
Crosses were made by using the tetraploid as the male parent and the diploid as the female. By the time of the first October frosts, the crossed fruit was still completely unripe while that of the diploid control was fully ripe. Also the number of normal seeds was lower in the cross with the tetraploid and the germination was bad. One of the seedlings proved to be a triploid. The results of the investigation are discussed and among other things the possibility of increasing the size of small-fruited varieties by means of polyploidy is noted. R. M. I.

1198. LATTIN, G. DE 634.835:576.356.5:575.242
Spontane und induzierte Polyploidie bei Reben. (**Spontaneous and induced polyploidy in vines**).
Züchter 1940 : **12** : 225–31.
The cases of genom mutation already known in *Vitis* are briefly discussed. R. M. I.

1199. BREIDER, H. 634.835:581.162.5:575.127.2
Über Pollenfertilität der Rebenarten und ihrer F_1-Bastarde. (**Pollen fertility in vine species and their F_1 hybrids**).
Züchter 1940 : **12** : 209–12.
A study of the pollen of species of *Vinifera, Riparia, Rupestris* and of their hybrids, showed that the majority of the pure species had well-formed pollen. The F_1 hybrids, on the other hand, had a certain amount of deformed pollen, in some cases up to 54%. R. M. I.

1200. WETTSTEIN, W. VON 634.97:575
Über den gegenwärtigen Stand der forstlichen Pflanzenzüchtung. Ein Rückblick und Ausblick. (**The present position of forest plant breeding. A glimpse into the past and future**).
Allg. Forst- u. Jagdztg. 1942 : **118** : 128–31.

Forest tree breeding is still largely in the experimental stage; mass selection has given good results in certain cases, crossing individual trees known to give good offspring has been used with some species, and various methods whereby this can be achieved or facilitated are cited. Other topics considered are the value of hormone treatment for propagating desirable forms vegetatively, the heterosis characteristic of many interspecific hybrids, the value of chromosome counts in identifying interspecific hybrids, the increased size and vigour of many polyploids and the need for methods of artificially inducing polyploidy.

1201. SCHENCK, C. A. 634.97:575:577.17
Forstliche Genetik in den Vereinigten Staaten. (**Forest genetics in the United States**).
Allg. Forst- u. Jagdztg. 1942 : **118** : 126–28.

The vegetative propagation of forest trees by the use of plant hormones has given forest genetics a new and enhanced practical importance. The author prophesies the utilization of phenomena such as heterosis and polyploidy in practical forestry, now that the individuals displaying them can be propagated vegetatively.

1202. SMITH, E. C. and
NICHOLS, C. (jun.) 634.97:575.127.2
Species hybrids in forest trees.
J. Arnold Arbor. 1941 : **22** : 443–54.

The importance of hybridization experiments in conjunction with research on seed origin and progeny tests in forest tree seed improvement is pointed out. Development along such lines on a large scale have been relatively recent. The historical and economic background of forest tree breeding is briefly outlined with due reference to European and American investigators and to modern researches on auxin and colchicine and their respective uses in vegetative propagation and the breeding of trees.

The widespread occurrence of protandry and protogyny and the occasional occurrence of dioecious species among forest trees are mentioned as the cause of the common phenomenon of natural interspecific hybridization. Knowledge of the occurrence of such hybrids and of the success attained in artificial species hybridization provides useful information for planning a breeding programme, specially when the chromosome numbers are already known.

Existing data on natural and artificial interspecific hybrids in 16 genera of local importance in United States are shown in a table based on the survey list of Johnson (1939) (cf. "Plant Breeding Abstracts", Vol. X, Abst. 311), with some additions and changes. The chromosome numbers were taken from Tischler, Peto, Dillewijn, Duffield and for *Populus* and *Catalpa* in some instances from the unpublished work of Smith. The table, which shows the number of species in each genus, the chromosome number or numbers, the number of natural and of artificial hybrids and the number of species used in crosses, is supplemented by an analysis from the taxonomic and cytological standpoint in which the findings of Heimburger (1940), East (1940) and other investigators are cited.

Hybridization work at the Arnold Arboretum has been mainly confined to *Populus*, *Betula* and *Pinus*—three genera of importance when the trees are to be used as a source of cellulose. The relative value of different techniques of hybridization are demonstrated including the use for *Betula* of sausage tubing (instead of glassine bags) for covering large numbers of small flowers on one branch. The best results were obtained when aeration was allowed for by plugging the ends of the tube with cotton wool.

The large number of natural hybrids reported as occurring in the genus *Quercus* and the few records of artificial ones show that the proper techniques for this group have not yet been evolved. The same applies to *Acer*.

With *Juglans* and *Carya* it seems likely that an excess of pollen on the stigmas of ♀ flowers renders crosses unsuccessful and special techniques are needed for these two groups.

The value of embryo culture where seed germination is defective though the actual set may be good is pointed out.

Among the seedlings awaiting study at the Arboretum are some from crosses between species of *Pinus* (the white pine species) and other genera of conifers, and some *Populus* species hybrids. The authors have recently attempted some interspecific crosses in the genera *Abies*, *Betula*, *Carya*, *Catalpa*, *Fagus*, *Fraxinus*, *Juglans*, *Picea*, *Pinus*, *Populus*, *Quercus* and *Ulmus* and lists of a large number of possible hybrids obtained by hybridization in 1938 and 1939 within the genera *Betula*, *Populus* and *Ulmus* are enumerated. The cross *Ulmus Wilsoniana* Schneid. x *U. japonica* (Rehd.) Sarg. seems to be more resistant to insect attack and more vigorous than *U. japonica*. Observations on these hybrids are not yet complete but the *Populus* "hybrids" that have *P. Maximowiczii* Henry as the female parent appear to be the most promising.

1203. 634.972:575(48.5)
581.143.26.035.1:634.972(48.5)

Föreningen för växtförädling av skogsträd. (**The Swedish Forest Tree Breeding Association**).
Svensk PappTidn. 1940 : **43** : 90–92.

Marked differences have been recorded at Ekebo between the growth of hybrids from crosses between aspens from northern Sweden and from southern Swedish crosses—the former attained only a few cms. in length, while the latter were not infrequently a metre long. Experiments were therefore planned to elucidate the significance of length of day in increase in height of the aspen. The typical dwarfing reaction of a long day plant subjected to short day treatment was obtained when aspens from Norrbotten with a 24 hour length of day in summer were transplanted to Ekebo (Skåne) which has only 20 hours. Specimens from Medelpad and Hälsingland showed a similar reaction, whereas others from Västergötland and Skåne gave the reaction of short day types. As indications of the same photoperiodic effects were found in pine, spruce and birch seed of northern provenance, further tests of northern aspens were made by growing them at Ekebo under normal day and under protection from the light for 12 hours per day. The results showed that the aspen of northern Sweden, to which some of the most desirable forest types belong cannot, owing to its inherent long day character, be directly utilized in southern Sweden. It is therefore essential in aspen improvement work to determine the southern limits of cultivation for the most vigorous long day types. This work has been planned with aspens of different photoperiod and similar research is to be conducted with pine, spruce and birch.

In 1939 investigations on conifers were concentrated on the spruce in which previous studies of the type of branching had revealed a definite correlation between type of branching and valuable forest characters and a further study of this relationship was regarded as a highly important aim in the breeding and improvement programme. In autumn 1939 therefore an extensive survey was made of stands of Norway spruce from various countries including central Sweden (Skåne and Halland) and the marked superiority of the "kamgran" type of Norway spruce, with fine drooping branches, in vigour of growth was clearly observed: in the élite plantation at Wrams-Gunnarstorp, Stenbackarna, this type of spruce exceeded the others in mean diameter of the trunk by 8·67 cm. The maximum excess growth in length of trunk was 6·09 m.

Investigations on the quality (e.g. density and output of sulphite pulp) at present in progress in various quarters in Sweden should be of value in breeding operations. The results so far available indicate the superiority of the "kamgran" type as regards output, even though the other spruces may equal it in some other respects. The agreement between the analyses of the data at Östrand and Ekebo shows that by the line of research at Ekebo valuable comparative figures for yield of cellulose and lignin and resin content can be obtained by examination of spills taken with the borer from the living tree. See also Abst. 1205.

1204. Johnsson, H. and Eklundh, C. 634.972:575:581.04

Colchicinbehandling som metod vid växtförädling av lövträd. (**Colchicine treatment as a technique in the improvement of broad leaved trees**).
Svensk PappTidn. 1940 : **43** : 373–77.

The experimental material comprised (1) seeds of *Populus tremula*, *Betula verrucosa*, *B. pubescens* and *Quercus Robur*, (2) young plants of *Q. Robur* and (3) cuttings of *P. tremula*. The colchicine treatment induced polyploidy in both vegetative and floral tissues. The effect is not, however, uniform in the whole plant or plant portion. In many seedlings from treated

seed of aspen, birch and oak both tetraploid and diploid roots were found and both types of cell often occurred in the same root. But the fact that only tetraploid cells are found in all three roots examined in a plant is no guarantee that the whole root system is tetraploid or the entire plant polyploid. Moreover, the long stomata in treated aspens indicative of tetraploidy in the stem often occur in plants with only diploid cells and *vice versa*.
The cytological causes of such mosaic structure of tissues are explained and their subsequent development is discussed and the possibility is pointed out of a large and long lived tree reverting to the diploid state even though in the seedling stage it consisted to a considerable extent of tetraploid tissue. It is therefore advisable in utilizing mosaic seedlings for breeding purposes to isolate and rear the tetraploid portions (obtained by colchicine treatment) apart from any contamination, e.g. by grafting any tetraploid buds on a suitable stock. With aspens, which can be grown from root cuttings, tetraploid portions may easily be raised by dividing the required shoot and growing it separately. As no criterion exists for determining which buds or shoots are tetraploid as many portions as possible should be taken for raising as described and subsequent cytological examination and other diagnostic methods of investigation at a later stage of growth.

1205. Sylvén, N. 634.972:581.143.26.035.1:575(48.5)
Lång- och kortdagstyper av de svenska skogsträden. (**Long- and short-day types of Swedish forest trees**).
Svensk PappTidn. 1940 : **43** : 317–24, 332–42.
In recording the experiments already referred to (cf. Abst. 1203) on growth of aspen seedlings under conditions of shade and absence of shade, the author discusses long and short-day types of Swedish forest trees and their importance in Swedish forestry.
The 1938 experiments on aspen breeding at Ekebo and the observations on the photoperiodic reactions of the hybrids from northern and southern Sweden are fully discussed, many of the individual parents and their provenance and crosses being named. Plant height was also studied in Norbotten crosses and in other aspen hybrids from southern and central Sweden (Skåne and Västergötland).
Studies of photoperiodism in recent years have shown that the most important type of reaction is dwarfing due to short day; this has been recorded in *Acer*, *Robinia* and *Salix* species in addition to other economic plants.
The hybrids tested in experiments at Ekebo, Söråcker and Vittjärv showed that (1) the number of O-plants (i.e. "rosette" seedlings) increased as day length decreased; and (2) in general, mean height with full length of day increases as the latitude increases; (3) the parents used in the northern Swedish crosses were of a pronounced long-day type, while the parent forms from Västergötland, Småland and Skåne were of relatively short-day type—the Skåne aspens representing the extreme short-day type and the Västergötland ones the least markedly short-day. The progeny from the Norbotten aspen crosses appeared highly homozygous as regards length of day, whereas the Västerbotten and Medelpad progenies were more heterogeneous in this respect and evidence that they were probably the most heterozygous for the short-day character was obtained. The Småland and Skåne forms seem to be relatively homozygous as short-day types. That two sub-species of Pinus, *P. silvestris lapponica* and *P. silvestris septentrionalis*, probably differ constitutionally in their photoperiodic reaction might be inferred from the relevant literature and such differences must not be ignored in considering questions of provenance.
An extensive study in 1937 of progenies from mother pine trees from various areas in northern and southern Sweden revealed a close resemblance in plant development to the two distinctive groups subsequently found to differentiate the Swedish aspens of northern and southern provenance, so that a similar photoperiodic response and variation must be attributed to both genera (cf. "Plant Breeding Abstracts", Vol. IX, Abst. 863).
Previous research on the relations between provenance and physiological characteristics, climatic factors and vegetative period is reviewed.

1206. Schreiner, E. J. and
Duffield, J. W. 634.972.1:575.183:575.127.2
Metaxenia in an oak species cross.
J. Hered. 1942 : **33** : 97–98.
In a cross between *Quercus alba* and *Q. Robur* the acorns on 23rd September, 1941, varied in

colour between brown, as in the seed parent, and light green as in the pollen parent, the green acorns being still immature. The hybrid acorns were also larger than those produced by selfing.

1207. Vogelsang, P. 634.972.3:575.12
Hybrid poplars.
Paper Tr. J. 1941 : **113** : No. 20 : 38–40.

American research has shown that hybrid poplars are far better growers than any of the native varieties and will do quite well on the lands that will not support native growth. An average growth of an inch a day has been recorded on some hybrid varieties in the first season and average growths of 10 feet during the second and third season. The best hybrids are propagated by cuttings. Hybrid poplars produce good coppice growth and therefore give a second crop in the minimum of time.

The hybrids are tested also for reaction to poplar rust and to poplar borer and leaf beetle; some have proved definitely immune from borer attack. A standard analysis for pulping quality is carried out; the wood of the hybrids contains a higher proportion of alpha-cellulose than American native aspens and owing to their even growth rate the hybrids produced a higher percentage of summer wood, which is high in fibre and low in lignin; the fibres are somewhat longer than those of the native aspens.

1208. 634.972.3:575.127.2
Jablokov, A. S. 634.54–2.111–1.521.6:575.127.2
(Interspecific hybridization in sylviculture).
Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : 39–45.

Data are given showing the differences in both yield and quality of wood that may be observed between different races or ecotypes of the same species grown under similar conditions, illustrating the desirability of carrying out selection among wild forest species with a view to improving their quality. Selection alone, however, and even intra-specific hybridization, are thought to be insufficient and recourse to interspecific crossing is recommended. Interspecific hybrids often display marked heterosis and greater disease resistance. The wild Russian *Populus tremula* has been crossed with other poplar species, thereby improving its rate of growth, wood quality, type of branching and capacity for reproduction by cuttings. Hybrids with *P. Bolleana* Lauche. are specially promising; they are erect, rapid growers, producing handsome, compact, leafy, pyramidal trees, which are extremely frost resistant and reproduce well by cuttings. Even the hybrids that did not inherit the pyramidal habit of *P. Bolleana* had more erect trunks, and more uniform lateral branches than the aspen and were easier to trim and free from heart rot.

Hybrids of *P. alba* x *P. Bolleana* were also fine quick growing trees with pyramidal habit and tolerated —7° C. without damage to leaves.

Improved hardy hazel nuts have been produced by crossing the local *Corylus avellana* with imported Barcelona nuts.

1209. Johnsson, H. 634.972.3:581.16:578.08(48.5)
Generativ och vegetativ förökning av *Populus tremula*. (**Generative and vegetative multiplication of *P. tremula*).**
Svensk Bot. Tidskr. 1942 : **36** : 177–99.

Full details (and illustrations) of Wettstein's method of propagation are given including useful practical hints on selection of material and how to counter various difficulties (e.g. the presence of larvae in the catkins) and how to obtain a good supply of seed. The amount of seed that can be got from a few branches is considerable. Crosses between diploid parents showed an average of 10 well formed seeds per capsule, with 12 and 7 as the maximum and minimum numbers respectively; while the average number of capsules per catkin was 200. Germination is usually 100% or a little less—below 95% is rare. It is calculated that with accommodation for 100 pots about 10 million seeds could be planted.

The raising and care of seedlings is described with remarks on the cost of poplar cultivation on a large scale.

The vital importance of breeding from parent trees or combinations that give superior progeny is stressed. Trees that are hereditarily suitable as regards growth, disease resistance, shape of trunk, etc., must be sought out. The Institute for Forest Tree Breeding is working energetically along these lines with all forms of Swedish forest trees of which large numbers of

crosses are being made and tested for a series of years before proceeding to select high grade progeny for seed production.
Various methods of vegetative propagation are also discussed and illustrated.

1210. JENSEN, H. 634.972.6:581.165.71:575(48.5)
Flaskympningsmetoden och dess användbarhet inom skogsträdsförädlingen. (**Bottle grafting technique and its application in the improvement of forest trees**).
Svensk PappTidn. 1942 : **45** : 33–36.

In order to carry out effective and large scale hybridization of trees in Sweden it is necessary to have raised in pots a supply of small but abundantly flowering specimens of the most valuable native trees; these "dwarf" trees can, when required, be transferred to the greenhouse for controlled cross-pollination. The ease with which seed has been obtained at Ekebo from aspens and other poplars is due to the short time they take to produce seed, the aspen requiring only about 14 days under artificial illumination indoors. Wettstein's method was tried at Ekebo also with birches and elms, both of which mature their seed relatively early though the amount produced is relatively little. The results were not very encouraging and it was decided in 1940 to test the old so-called "bottle grafting" method (now practically obsolete) here described in detail with illustrations. The principle underlying this method is the maintenance of the graft alive until fusion with the stock has taken place. The technique required a supply of vigorous and fresh stocks which have already been growing in a pot for a year.
The graft must in no case be larger than half the size of the stock. The actual grafting is done as a type of "approach" graft (though the scion in this case has no root and derives its nourishment from the water in the bottle); and in about six weeks the whole of the graft below the site of union can be cut away and the scar surface covered over with wax. Plants thus obtained and later transplanted into larger pots will in a few years be so big that a considerable quantity of hybrid seed will be able to be obtained. At Ekebo this method was successfully applied to the birch, one of the most difficult trees to graft and therefore a good criterion of the value of the technique. Tests with nutrients in solution in the bottle attached to the graft and with hormone paste applied to the site of union showed that no such assistance was necessary.
Among the great advantages of this technique are the possibility of extending hybridization work on a large scale and artificially synchronizing flowering periods which frequently under natural conditions differ by several weeks for the same species in different parts of Sweden.

1211. 634.972.8:581.481
EKDAHL, I. 581.331.1
Die Entwicklung von Embryosack und Embryo bei *Ulmus glabra* Huds. (**The development of embryo sac and embryo in *U. glabra* Huds**).
Svensk. Bot. Tidskr. 1941 : **35** : 143–56.

The author surveys the findings of other workers on embryo and embryo sac development in various species of *Ulmus* before presenting his own observations. The question of polyembryony and twinning is discussed.

1212. JOHNSSON, H. 634.973:576.312.35
Die Chromosomenzahl von *Carpinus betulus* L. (**The chromosome number of *C. Betulus* L.**).
Hereditas, Lund 1942 : **28** : 228–30. (Abst.).

Meiosis was studied in 17 trees from different parts of Sweden and the chromosome number $n = 32$, $2n = 64$ established, in contrast to the number $n = 8$ reported by previous authors. In *C. cárpinizza* and *C. Tshonoskoii* $n = 8$ was found.
No sign of secondary association of of other meiotic irregularities was observed in the octoploid individuals.

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1213. MARCHENKO, I. I. 635.24:575.127.2:633.854.78
(**Distant hybridization in Jerusalem artichokes**).
Vestnik Gibridizacii (Hybridization) 1941 : No. 1 : 114–15.

Crosses were made of the annual species *Helianthus annuus* L., *H. cucumerifolius* T. and G. and

H. argophyllus T. and G. with certain artichoke varieties and *H. macrophyllus* Willd. and *H. subcanescens* (G.) Watson. The F_1 hybrids were intermediate in type and showed pronounced heterosis; this was especially evident when one of the tuberiferous species served as seed parent. All but 2 of the 81 hybrids were perennial and bore tubers; some yielded 2–3 times as much as the tuberiferous parent; the tubers were generally larger than those of the parent. Thus tubers weighing 50 grm. were obtained from sunflower crosses with *H. subcanescens*, the tubers of which seldom exceed 5 grm. The tubers of the hybrid plants were borne in more compact clusters than those of the parents and their sugar content was much greater. They rot very easily and further selection is being carried out against this defect.

1214. Jones, H. A. and Clarke, A. E. 635.25:576.356.5:575.127.2
A natural amphidiploid from an onion species hybrid—*Allium cepa* L. x *Allium fistulosum* L.
J. Hered. 1942 : **33** : 25–32.

A single amphidiploid ($2n = 32$) was obtained in the F_1 generation from the cross *Allium Cepa* (Australian Brown) x *A. fistulosum* (Nebuka). It was completely self-fertile and true-breeding—thousands of normal F_1 plants from the same cross were all completely sterile. The amphidiploid was taller than either parent and had larger stomata, pollen grains, flowers and seeds. Its seedlings grew more rapidly than those from the parents. The diploid and amphidiploid hybrids were perennials like *A. fistulosum* but they had much larger bulbs than this parent. Meiosis in the amphidiploids was fairly regular and all pollen grains were found to have $n = 16$ chromosomes. Some bivalents had the *fistulosum*-type and others the *Cepa* type of chiasma formation. H. W. H.

1215. Castan, R. 635.25:581.43:577.17
Variation dans la morphologie de la racine d'*Allium cepa* sous l'action de l'acide β indol-acétique. (**Variation in the root morphology of *A. Cepa* under the action of β-indol acetic acid**).
C.R. Soc. Biol. Paris 1941 : **135** : 765–66.

The production of secondary roots was obtained by the treatment. R. M. I.

1216. 635.34–1.521.5(43)
Sortenbereinigung bei Kopfkohl. (**Attaining varietal purity in cabbage**).
Mitt. landw. 1941 : **56** : p. 880.

A variety list of the main forms suitable for different areas and different uses has been prepared and includes two promising new varieties, a Savoy variety Dr Neuers Grüner and a white cabbage Nagels Frühweiss.

1217. Krevčenko, L. E. 635.62:575.114
(**A case of heterogeneity in the first hybrid generation**).
Jarovizacija 1941 : No. 3 (36) : 111–12.

Various *Cucurbita* crosses are referred to in which differences were observed between individual plants of the F_1, some of which displayed characteristics not observed in either of the parents or the other F_1 plants.

1218. Berkner, F. 635.62:581.6:633.85
Der schalenlose Kürbis, ein Fett- und Eiweisslieferant. (**The testa-free gourd, a source of fat and protein**).
Züchter 1940 : **12** : 123–26.

Two types of testa-free gourd are described, one obtained from v. Tschermak and the other from the Steiermark district.
An analysis of the seeds showed an average of 47·03% of fat and 29·10% of protein which surpasses that of any other indigenous oil-producing fruit. Further improvements could be made by breeding and the technical difficulties of preparing the seeds have to be overcome. Also the flesh of the fruit could probably be used as fodder. R. M. I.

1219. LANDE, O. 635.64:575(76.6)
Tomatoes on firing line. The way to give "staying power" to our fighting yanks.
Market Gr. J. 1942 : **70** : 162–63, 168–69.
The article contains a correction of a statement made in an earlier note (see "Plant Breeding Abstracts", Vol. XII, Abst. 881) regarding the length of time Redwin and Pinkhoma have been tested at Oklahoma.

1220. POTAŠNIKOVA, B. G. 635.64:575.257:575"793"
(Promoting early ripening and increasing the yield of the seed generation of the tomato grafted on Black Nightshade).
Jarovizacija 1941 : No. 2 (35) : 114–16.
Some 300 grafts were made of the tomato varieties Bison, Sparks Gribovo and Best of All on *Solanum nigrum*. All the grafts survived temperatures of +2 to +4° C which killed the ungrafted controls. Seed obtained from the grafted plants gave rise to plants on which the fruits ripened 10–12 days earlier than the control, the fruit weight and yield being almost twice as great.

1221. ERMOLAEVA, N. I. 635.64:575.257:633.491:575"793"
(An experiment in vegetative hybridization in order to obtain economically valuable types of tomato).
Jarovizacija 1941 : No. 2 (35) : 31–34.
Studies were made of the seedling progenies of a number of varieties and hybrids of tomato grafted on wild species of *Solanum*, including *S. demissum*, *S. acaule* and *S. nigrum*. Some progenies showed an improvement in such characters as size of fruit, yield of fruit per plant and proportion of fruits maturing. Others gave a decrease but it was found that those families which gave the best results out of doors often gave the worst in the greenhouse and *vice versa*. Many of the progenies gave a higher percentage of mature fruits, showing that a reduction in heat requirement had been effected.

1222. SOLOV'EVA, N. A. 635.64:575.257:633.71
(Changes in the chemical composition of tomatoes as a result of grafting).
Jarovizacija 1941 : No. 2 (35) : 109–11.
Grafts of the Humbert tomato on *Nicotiana Tabacum* bore fruits with an increased content of dry matter, sugar and acid. Nicotine was present in both the leaves and fruits. The seedling progeny of the grafted plants also contained small quantities of nicotine or some allied body.

1223. YOUNG, P. A. 635.64:581.47:575.242
Two genetic characters of tomato fruits that might be mistaken for symptoms of disease.
Phytopathology 1942 : **32** : 436–38.
Broad, dark-green stripes resembling mosaic symptoms were found in the peel of 2 tomato fruits. The condition apparently resulted from a mutation and 2 fruits produced 23 plants with many striped fruits, some of which were also pitted at maturity. The 3rd generation from both striped fruits and from fruits with stripes and pits produced a large proportion of fruits with both stripes and pits.

1224. DASKALOFF, CH. 635.646:575.125
Beitrag zum Studium der Heterosis bei der Eierfrucht (*Sol. Melongena* L.) und die Möglichkeit einer praktischen Ausnutzung. [**The study of heterosis in the egg plant (*S. Melongena*) and the possibility of its practical utilization**].
Forschungsdienst 1941 : **12** : 617–18.
The F_1 plants in crosses between local Bulgarian and imported egg plant varieties showed pronounced heterosis in respect of yield, differences varying between 10 and 44% being recorded. The hybrids also ripened their fruits earlier. It is perfectly possible to produce heterosis varieties on a commercial basis.

1225. COULTER, F. C. 635.646:576.16
Story of garden vegetables. IX. Egg plant—and its travels from ancient India.
Seed World 1942 : **51** : No. 1 : 36–37.

The evolution of the species *Solanum Melongena*, its names and its varieties is traced from its supposed home in ancient India, through the Arab world and the Mediterranean to present-day America.

1226. ZAUMEYER, W. J. 635.652:581.45:575.113.4.061.633
Inheritance of a leaf variegation in beans.
J. Agric. Res. 1942 : **64** : 119–27.

A type of leaf variegation occurring in progenies involving the variety Corbett Refugee directly or indirectly as parent was found to be determined by duplicate recessive factors, as indicated by the F_2 and F_3 segregations. Varying degrees of severity of the variegation and deficiencies of variegated plants are attributed to the action of modifying factors, which apparently suppress the variegation almost completely in Corbett Refugee.

This type of variegation is almost identical with that previously described in Wisconsin Refugee as a virus disease, "one-sided mosaic". It affects both the primary leaves and the trifoliate leaves and is often lethal. Another type, which is similar except that it only affects the trifoliate leaves, is inherited independently.

It is recommended that the use of the mosaic-resistant variety Corbett Refugee as a parent should be avoided. U.S. No. 5 Refugee is mosaic-resistant and free from variegation. J. L. F.

1227. RAMSEY, G. B. and WIANT, J. S. 635.652–2–1.521.6
Market diseases of fruits and vegetables. Asparagus, onions, beans, peas, carrots, celery, and related vegetables.
Misc. Publ. U.S. Dep. Agric. 1941 : No. 440 : Pp. 70.

The use of resistant varieties to control anthracnose (*Colletotrichum lindemuthianum*) on *Phaseolus* spp. is complicated by the fact that there are several forms of the causal organism, and plants resistant to one may not be so to another. Suitable varieties should be tested for each locality.

By selection and breeding, varieties of beans (e.g. Refugee types) have been obtained which show some resistance to bacterial blight (*Phytomonas phaseoli*) and halo blight (*P. medicaginis* var. *phaseolicola*); there are, however, some varieties resistant to the common bacterial blight but not to the halo type of blight or to bacterial wilt (*Phytomonas flaccumfaciens*).

Control measures which involve selection are noted for certain other diseases of the crops recorded.

1228. OBERMAYER, E. 635.655:575.42(43.91)
A szójabab termesztésének jelentösége hazánkban. (**The importance of growing soya beans in Hungary**).
Rep. Hung. Agric. Exp. Sta. 1939 : **42** : 153–56.

A brief historical summary is given of European experiments on the acclimatization of the soya bean and the relatively small area under this crop in Hungary is attributed to the continental climate.

Varieties with short vegetative period have, however, been successfully acclimatized in some regions and there do well.

Breeding and/or acclimatization of varieties with a short vegetative period is highly important as is also the precise determination of micro-climatically suitable regions. In these parts of the country any well adapted varieties should then be developed for maximum yield. No varieties with a long vegetative period need be re-tested as the main type of climate precludes their practical use.

There is hope that the extension of artificial irrigation of the Plains will help to provide the requisite micro-climatic conditions and that a new regional variety for the Plains could then be evolved.

The Royal Experimental Stations in Magyaróvár and Szeged have obtained up to 93% improvement in yield following bacterial inoculation in experiments with acclimatized soya beans undergoing improvement.

A network of experiments has been established throughout Hungary to promote the breeding of suitable regional varieties and the study of regional requirements of the plants both as regards nutrition and inoculation.

1229. SONNENSCHEIN, C. 635.655:576.356.5:581.04
Neuere Forschungen über die Erzeugung polyploider Formen von Sojabohnen. (**Recent investigations on the production of polyploid forms of soya bean**).
Forschungsdienst **1941** : **12** : 532–37.
Seeds of soya bean were germinated in solutions of varying concentrations of atropine, colchicine, nicotine, veratrine and strychnine nitrate and of various mixtures of these components. The effect of these solutions, and of acenaphthene vapour, on the growing points, is described. Cytological observations showed 19 and 20 somatic chromosomes in the normal soya. The highest chromosome numbers were found in plants treated with veratrine + colchicine, atropine + colchicine, atropine + veratrine, atropine + nicotine and nicotine + colchicine. Both tetraploid and octoploid cells were present in these plants. Many of the polyploid plants had larger stomata, flowered more profusely and bore pods with 3 and 4 seeds.

1230. ROSEN, G. VON 635.656:575.11–181:581.46:581.162
Eine physiologische Wirkung der Blütengrösse bei *Pisum*. (**A physiological effect of flower size in *Pisum***).
Hereditas, Lund **1942** : **28** : 240–41. (Abst.).
The small flowers of *P. abyssinicum* remain open for a much shorter time than the large flowers of *P. sativum*, and invariably close up during cloudy weather. In F_1 and even F_2 hybrids between the species the flower size is intermediate and the flower behaviour resembles that of *P. sativum*.

1231. LAMPRECHT, H. 635.656:575.113.3.061.63
Genstudien an *Pisum sativum*. V. Multiple Allele für Punktierung der Testa: Fs_{ex}-*Fs-fs*. (**Gene studies in *P. sativum*. V. Multiple alleles for speckling of the testa**: ***Fs*$_{ex}$*-Fs-fs***).
Hereditas, Lund **1942** : **28** : 157–64.
The gene *Fs* for testa speckling is distinct from *F*, which produces the same effects in the presence of the basic gene *A*. A form with excessively large spots was found to be not conditioned by a separate gene but by a gene showing very much the same linkage relationships as *Fs*. Crosses between this form, the normal *Fs* speckled and unspeckled forms here reported show the new gene to be a dominant multiple allele of *Fs*, which is designated Fs_{ex} (*expandere*).

1232. LAMPRECHT, H. 635.656:575.116.4
Die Koppelungsgruppe *Gp-Cp-Fs-Ast* von *Pisum*. (**The linkage group *Gp-Cp-Fs-Ast* of *Pisum***).
Hereditas, Lund **1942** : **28** : 143–56.
The findings of other investigators are summarized. The author's own crosses here reported show that *Fs* and *Ast* are strongly linked, with a cross-over value of 1%, that *Fs* is united with *Gp*, with 40·5% crossing-over in one cross and 39·7% in another, and that *Gp* is linked with *Cp* with 3·2% crossing-over. The genes thus belong to one linkage group and appear to be in the order *Gp–Cp–Fs–Ast* in the chromosome. The gene *Fs* is independent of *F*, which produces a similar speckling of the seed coat.

1233. ROSEN, G. VON 635.656:575.127.2:575.116.4
Linkage studies in *Pisum sativum* x *P. abyssinicum*.
Hereditas, Lund **1942** : **28** : 136–42.
The cross was difficult to effect and the set of seed was low. The average pollen fertility in the F_1 was 37% but some plants were fully fertile, while some were entirely sterile. Marked deviations from the Mendelian ratios were observed in the behaviour of a number of known characters but the genes in the two species appear to be in general homologous and their arrangement on the chromosome the same, though the linkage values tend to be lower in the species cross. The following gene formula is arrived at for *P. abyssinicum*: *Le, La, lb* or *la,*

Lb, *td*, *d*, *Gp*, p_1, *A*, *Ar*, *B*, *Am*, Wb_2, *Fa*, *St*, *K*, *Tl*, *P*, *V*, *Btb*, Cp_1, Cp_2, *S*, *m*, *F*, *I*, R_1, (R_2?), *Pl*, U_1, U_2. Altogether 142 interactions between the 30 genes participating in the segregations have been investigated, 62 of which have not been previously reported. The genes are arranged in chromosome groups according to these data and those of other authors.

1234. PUKHAL'SKAJA, E. P. 635.656:575.3:581.143.26.035.1
(Inheritance by the Irlandets pea of characters acquired as a result of growing in situations geographically different).
Jarovizacija 1941 : No. 2 (35) : 104–07.

The Irlandets (Irishman) pea was grown in 4 different parts of the Soviet Union. When seeds from these 4 lots were grown all together near Leningrad flowering in the resulting plants began at different times and proceeded at different rates; the material grown in the more southerly districts flowered earlier in 3 successive years of growing in the north; its yield however was somewhat less than that of the northern material, except in years of low rainfall, and its protein content less.

1235. FUCHS, W. H. 635.656:581.6:575(43)
Untersuchungen über die Qualität der Gemüseerbsen. (**Investigations on the quality of garden peas**).
Züchter 1942 : **14** : 94–96.

Laboratory tests carried out under conditions as nearly as possible approximating to industrial canning showed that the marrow fat types were lower in dry matter content but higher in sugar content, particularly the larger, older peas; consequently they can be allowed to remain longer on the plant before canning than peas of other types. Selection can be carried out on this character in the early stages of breeding for quality.

1236. 635.658:575(43.6)
TSCHERMAK-SEYSENEGG, E. VON 635.658:575.127.2
Über Linsenzüchtung. (**Lentil breeding**).
Züchter 1942 : **14** : 81–83.

By crossing *Lens macrosperma*, characterized by large, flat seeds with fine seed-coat and whitish green cotyledons with a small thick seeded Abyssinian "pea" with thick testa and orange cotyledons the author has produced a form with medium sized thick seeds, with fine light coloured testa and orange cotyledons, giving the seed a reddish appearance. The new form is superior in flavour and is somewhat earlier than *L. macrosperma* in maturity.
Segregation was observed in the F_2 of the cross for seed size, though no form was as large as the *L. macrosperma* parent. Segregation in seed coat colour was also observed.
The technique used in making the crosses is described.

BOOK REVIEWS

ZIMMERMAN, F. L. and
READ, P. R. 016:63(73)

Numerical list of the current publications of the United States Department of Agriculture. Compiled by comparison with the originals.

Superintendent of Documents, Washington, D.C. 1941 : $1.75. Pp. v + 929. (Misc. Publ. No. 450).

This publication is intended for use strictly as a "working list" for institutions and persons engaged in intelligence work such as information services, libraries and editors dealing with requests for information on agricultural subjects. It is not to be regarded as a complete list of the publications of the U.S. Department of Agriculture and is not intended for general distribution.

The introduction gives directions for the exact identification of any individual publication of the Department, regardless of possible inaccuracies in the citing of the title and series, etc., by the applicant requesting a copy of the publication. In other words, it is an industrious and helpful effort to counteract the normal inaccuracy of the average enquirer seeking published information from the U.S. Department of Agriculture and the numerous libraries and institutions throughout the world that contain its publications.

The volume is well printed and space has been left for the additions which will no doubt need to be included from time to time during use.

A stronger binding would have been preferable to the paper cover, but at the present time the cost would have been high and the institutions for whom the book is intended can probably afford the individual expenditure on binding.

BEADNELL, C. M. 5:030.8

Dictionary of scientific terms as used in the various sciences.

Watts and Co., London 1942 : 2nd Ed. 2s. 0d. Pp. x + 232 + 13. (The Thinker's Library, No. 65).

A second revised and enlarged edition of this admirable little book of reference whose excellence was emphasized in the review published in "Plant Breeding Abstracts", Vol. XI, p. 62 has now appeared. The new edition contains a further supplementary list of scientific terms and expressions, many of which pertain to the current terminology of modern theories in physics and mathematics and other sciences.

The book can once again be highly recommended to all libraries and schools and to specialists as well as all intelligent laymen and students interested in scientific advances in various fields.

BUROS, O. K. (Editor) 519.24:016

The second yearbook of research and statistical methodology books and reviews.

Gryphon Press, New Jersey 1941 : $5.00. Pp. xx + 383.

A review of reviewers. The editor has compiled in a well printed volume the essential parts of all reviews of books dealing with statistical methods and research. Only reviews written in English and books in the English language have been dealt with so far, but the editor intends to widen the scope in future yearbooks.

With the publication of this series the editor has (among others) the following objectives in mind

2. To help students, teachers and librarians to select text books with greater discrimination.
3. To point out to students and teachers the weak and strong points of particular books.
6. To emphasize that there are usually marked differences of opinion even among the more advanced students of statistical theory in their appraisal of a particular book.
10. To improve the quality of reviews by stimulating editors to take greater pains to choose competent reviewers who have the industry and the courage to contribute frankly critical reviews following a careful study of the book being reviewed.

A glance through the book reveals that there is, indeed, a considerable variation between reviews of the same book. Now, this is partly due to the legitimately varied scientific aspect from which they are judged. A biologist would therefore do well to pay particular attention to the verdict of a biological statistician, or at least take note of the reviews in biological journals, but even then he will come accross divergence of opinion, and particularly in matters statistical.

To lay open these variations in judgment by confronting the verdicts of fellow scientists on the same pages of a book is certainly a great help to librarians, students, etc., who want to decide whether to have the particular book; but it does not, of course, help to decide which of the reviewers is right. To get the full benefit from their opinions it will be necessary to know the reviewers themselves, that is, to know their tastes and personal likes and dislikes. But he who has so much knowledge on the subject will probably follow his own opinion on the book. However, the reader of the yearbook will at least be warned not to follow blindly the opinion expressed in one particular journal of his own science.

As a secondary objective the editor is concerned with improving the quality of reviews by competitive comparison, and here, we agree, the book should have considerable effect. It will certainly induce reviewers to be more careful in appraising a book or making rash statements based on reading sampled passages. Editors on the other hand will find the book a guide in judging the accuracy of opinion of their statistical collaborators. H. O. H.

ECKERT, W. J. 519.24:578.08

Punched card methods in scientific computation.

The Thomas J. Watson Astronomical Computing Bureau, Columbia University 1940 : Pp. vii + 136. 23 figs.

The use of the punched card systems in census work and the tabulation of routine statistics is well known among a wide circle of statisticians and administrators. In fact, the systems were originally designed to deal with tasks of this kind.

The Hollerith-System, where contact between punched card and counter (as well as other machine units) is established by electric current is sufficiently flexible to allow its application to calculations of a scientific and technical-statistical nature.

Pioneer work on the application of this system to scientific problems (such as the calculation of nautical tables) (L. J. Comrie) and the analysis of large scale statistical data (Hey and Hudson) was done in this country. The author describes in detail the admirable work he and his collaborators at the Thomas J. Watson Astronomical Computing Bureau have done with their equipment of American Hollerith machines.

Although the problems dealt with are mainly astronomical they are of interest to biologists (concerned with large scale analysis of data) in that they involve general principles of using this system of mechanical computing. Two words of warning must, however, be given to British readers. The author's equipment does not provide the facilities offered by the 'rolling total' tabulator, a name given to a modern British model on which counter totals may be transferred (positively or negatively) to any other counter. Many of the schemes for which the author suggests the use of the 'Multiplying Punch' are obsolete when compared with the far superior methods which make use of the 'rolling' of 'totals' on modern British models. On the other hand the author's schemes are often based on direct subtraction of quantities punched on cards, a facility provided by American machines but sadly lacking on British models.

Too little attention has been paid to the economy of the use of Hollerith equipment, indeed, some of the author's examples are better done on ordinary desk calculating machines (even if the cost factor is ignored), and the use of Hollerith machines is very much like using a steam hammer to crack a nut. H. O. H.

575.1

HALDANE, J. B. S. 575.1.061.6

New paths in genetics.

George Allen and Unwin, Ltd., London 1941 : 7s. 6d. Pp. 206. 17 figs. 10 tables.

This book is based on a series of lectures given at Groningen in 1940. It gives a very lucid and interesting account of several aspects of genetics in the development of which Professor Haldane has been specially concerned, though of course it is in no way limited to the results of his own research. Nearly all the material in it has been published separately, and much of it will already be familiar to readers of "Plant Breeding Abstracts", but, in view of the immense practical importance of the problems discussed, it has a very real value in connecting together scattered publications.

Particular emphasis is placed on the value of combined genetical and biochemical studies as an aid to the understanding of physiological processes. Studies of certain human abnormalities

such as phenylketonuria, alcaptonuria, etc., and the flower pigment work carried out by Scott-Moncrieff, Robinson and others are cited at length. The specific modes of action of various genes in development receive considerable attention, and many examples are cited, particularly in poultry and rodents. It is shown that genetic mutants form very valuable material for the physiologist who is studying the complicated inter-relations involved in either normal or abnormal development.

The last two of the five chapters of the book deal with human genetics. Examples of the various modes of inheritance of genetical defects are given and the mathematical relations between mutation and selection are discussed, with particular reference to the possibility of reducing the various types of abnormality by means of negative eugenics. The effect of the change in fairly recent years from a state in which marriages took place almost entirely within small, isolated communities, to one in which mating is more nearly at random, is discussed. Gene linkages and suspected linkages in man are dealt with in the last chapter, and particularly Haldane's own discovery of partial sex linkage and the beginning of chromosome mapping. Some indication of the complexity of calculating linkages in human pedigrees is given.

S. E

CLARK, H. W. 576.11

Genes and Genesis.

Pacific Press Publ. Assoc., California 1940 : $1.50. Pp. 155.

From the title of this book one might expect a semi-popular account of genetics in relation to development, but in fact it is the Book of Genesis which is referred to and the author's purpose is to show that the facts of genetics which bear on the origin of species support the account given in Genesis, not excluding Noah's Ark. While the author's account of genetics includes some mistakes which would be classed as howlers if there was anything amusing about them, they do not greatly affect the argument. His case is based less on scientific than on moral and ethical grounds. The weak spot in the defence into which he drives his wedge (though hardly with the calculated force of a Timoshenko) is the failure of genetics to explain the differentiation of the larger systematic groups. Since genetics, being based on breeding experiments, is not designed to do this, it follows that from the scientific point of view, Professor Clark's case is founded on a misconception of the scope of genetics. The other grounds do not lie in the province of Plant Breeding Abstracts but it is worth pointing out the book as an interesting curiosity for the student of the history of science. J. L. F.

BOURNE, G. (Editor) 576.3

Cytology and cell physiology.

Clarendon Press, Oxford 1942 : 20s. Pp. xii + 296. Illus.

This book is well described by a paragraph in the preface—"In this book an attempt has been made to bring together chemical, physicochemical, and morphological aspects of the study of cells. It has not been the aim to cover the whole field of cytology or of cell chemistry, indeed it would take a series of volumes to do so. The best that one can do is to choose a number of subjects which are representative of different fields of the study of cells and which relate, as far as possible, one to the other, and to bring them together within a single cover." The separate chapters are all well written but, good though the individual contributions are, one is left with the impression that a somewhat greater attempt should have been made to link them together. The book is, however, a valuable one and merits the attentions of all cytologists and experimental biologists. The unfamiliarity of much of the material should broaden the outlook of many workers and suggest to them new fields of investigation in their own specialist branches.

The following are the contents of the book—"Some aspects of cytological technique", by J. R. Baker; "Physical and physicochemical studies of cells", "Part 1—General", by J. F. Danielli and "Part 2—Monolayer technique", by J. H. Schulman; "The cell surface and cell physiology", by J. F. Danielli; "Mitochondria and Golgi apparatus", by G. Bourne; "Nucleus, chromosomes and genes", by M. J. D. White; "Micro-incineration and the inorganic constituents of cells", by E. S. Horning; "Enzyme systems of cells", by H. Blaschko and W. Jacobsen and "Pathological aspects of cytology", by R. J. Ludford. Plant geneticists and cytologists will be familiar with most of the work described in White's excellent chapter but they will find points of special interest to them in the chapters by Baker and Bourne.

The book includes a list of references, an index of authors and of subjects. The production is of the usual high standard to be expected from the Oxford University Press. H. W. H.

CONN, H. J. 578.65

Biological stains. A handbook on the nature and uses of the dyes employed in the biological laboratory.

Biotech. Publications, Geneva, N.Y. 1940 : 4th ed. $3.40. Pp. 308. 5 figs. Tables.

The third edition of this handbook was reviewed in "Plant Breeding Abstracts", Vol. VII, p. 343. The new material in the fourth edition consists of descriptions of 13 more dyes. These include chlorazol black E which is used as a general-purpose stain and the thiazol dyes which are used in fluorescence microscopy. The book has also been carefully revised by bringing the statements in it up to date and by correcting errors that had escaped revision in previous editions. It is obviously a very valuable, if not indispensable, reference book for those who are striving to make stain technology a science. H. W. H.

63(41)

Farming handbook.

Jarrold & Sons, Ltd., Norwich 1942 : 5s. Pp. 220. 52 illus.

It is suggested by the publishers that a careful reading of this Handbook will enable hard-pressed British agriculturists to solve many war-time problems. Certainly some of the articles contain much useful information but in the reviewer's opinion a really satisfactory Farming Handbook ought to be much more comprehensive. The contents of the book are :—"Crop production in war-time", by E. J. Russell, "Dairy farming in war-time", by H. D. Kay, "Soils and plant nutrition", by W. G. Ogg, "Research and fruit growing", by B. T. P. Baker, "Agricultural prices", by M. Messer and G. Browne, "Feeding farm livestock in war-time", by F. H. Garner, "Farming reclaimed land", by J. A. McMillan, "Modern machinery on the farm", by T. N. Wilks, "The control of pests attacking crops", by E. Holmes and W. R. Orrell, "Potato cultivation on a large commercial scale", by G. F. Young, "Electricity on the farm", by E. D. A., "War damage act", by an associate of the Chartered Insurance Institute, "Seed dressing", by D. Begbie and "Make sure—make silage", by C. A. Z. Ward. The book is illustrated by 52 photographs, most of which are very good. H. W. H.

GOURLEY, J. H. and 634
HOWLETT, F. S. 634:575

Modern fruit production.

Macmillan and Co., New York 1941 : $6.00. Pp. 579 : 50 tables. 87 figs.

This admirable illustrated manual starts with a survey of fruit growing throughout the world; among the many points of interest that emerge are the marked preference at present in America for the Delicious apple and the phenomenal rise to popularity of the grapefruit throughout the world.

Full morphological descriptions and definitions are given of the various organs comprising a fruit plant, including a detailed analysis of the structure of the main types of edible fruit.

The factors governing fruiting and flower bud differentiation discussed in Chapter 3 include carbohydrates, hormones and length of day. Soils and cultural measures are discussed in succeeding chapters. Chapter 10, under the heading "Fruit Setting", briefly outlines the reproductive processes; the many factors affecting fruit setting include, but are by no means confined to, sterility and compatibility relationships, which are discussed in relation to the different fruit crops.

The chapter on winter injury contains some remarks concerning varietal resistance in the different species, the various types of injury, the relative resistance of the different tissues and the best means of treatment. Nutrient difficiencies, physiological disorders and their treatment are also discussed. Chapter 15 is devoted to propagation and stocks and Chapter 16 to the origin and improvement of fruits. It is shown that within the last 25 years a small but growing percentage of the fruit acreage has been devoted to varieties developed through breeding projects of public agencies. Some 540 varieties have originated in this way and over 50 have become established or show considerable promise. The authors even go so far as to state that "in the improvement of the well-known, as well as the more unusual fruits, lies the possibility of the greatest advancement in pomology in this century." The available

information on the origin and the main results of breeding work up to date are outlined for the common fruits; the most important related wild species are enumerated and tabulated according to chromosome number, and their use or possibilities in breeding work are commented upon. The principal methods of breeding applied to fruit crops are described and some of the chief desiderata are explained.

Each chapter is provided with a selected bibliography, and the book, though not free from printing errors, is attractive in design and production.

NEW JOURNAL

Endeavour.

"Endeavour" is described as "a quarterly review designed to record the progress of the sciences in the service of mankind". Sponsored and published by Imperial Chemical Industries, the journal is to act as "a vessel to carry overseas news of the continuing vitality and progress of the sciences, which know no frontiers but are directed to improving the common lot of all men". The first number, which appeared in January, 1942, contains contributions by a number of distinguished scientists, including articles by C. H. Waddington on the Epigenotype, by J. G. Crowther on Science in the U.S.S.R. and by A. L. Bacharach on the Manufacture and Use of Vitamins. (Price 5s.).

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